A REVISION OF THE GENUS *AIOLOPUS* FIEBER (ORTHOPTERA : ACRIDOIDEA)

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A REVISION OF THE GENUS *AIOLOPUS* FIEBER (ORTHOPTERA : ACRIDOIDEA)

By D. HOLLIS

CONTENTS

SYNOPSIS

The genus *Aiolopus* is redescribed and defined, and notes are given on its biology. A key is given to the seven species and six subspecies included within the genus, and all of these are redescribed.

INTRODUCTION

For the past century the genus *Aiolopus* has been a source of anxiety to acridid taxonomists. It arose in confusion through being described twice in the same year, first as *Aiolopus* (Fieber, 1853, May) and then as *Epacromia* (Fischer, 1853, November), and its species have since been continually confused with one another.

Up to 1938 even the familiar association of *Aiolopus* was in doubt but firstly Zimin (1938 : 27) and later Uvarov (1942 : 336) placed the genus naturally in the subfamily Oedipodinae (here considered a part of the Acridinae) close to *Encoptolophus* and *Hilethera*. At the same time Uvarov (1942 : 337) erected two genera, *Platypygius* and *Epacromius*, from species previously included in *Aiolopus*.

In recent decades it has become increasingly obvious that the species of *Aiolopus* can and are becoming serious crop pests, being particularly able to adapt from their natural grassland savannah habitat to irrigated crop areas.

In the light of this knowledge and the confused state of the systematics of the genus it became clear that some form of revisionary work was necessary. The present paper attempts to revise the genus taxonomically and to introduce stability of identification of the species concerned.

Immediately prior to this work the genus was thought to contain seventeen recognizable species. In a previous paper (Hollis, 1967) the author transferred two of these species to other genera. The present paper recognizes seven species, including one newly combined species, with four others reduced to subspecific status and the remaining five sunk into synonymy.

All available types have been studied and where a type is lost or is inaccessible due to institutional policy this is clearly stated. If a type of a recognized species is destroyed a neotype is erected in the interests of stability of the nomenclature and where a species is based upon a series of syntypes a lectotype is erected from that series.

Distribution of the recognized species and subspecies is only considered in the light of material studied by the present author. Previous records are not considered, unless checked, because of the confusion which would arise from past misidentification and misapplication of names. For most species a large amount of material was studied and their distribution is presented in map form with notes on the countries in which each is found and the months of its known occurrence.

Type depositories are given in abbreviated form as follows:

Berlin—Zoologisches Museum der Universität, Berlin.
BM(NH)—British Museum (Natural History), London.
Copenhagen—Universitetets Zoologiske Museum, Copenhagen.
Leningrad—Zoological Institute, Academy of Sciences of USSR, Leningrad.
Maastricht—Natuurhistorisch Museum, Maastricht.
Madrid—Instituto Español de Entomologia, Madrid.
Paris—Museum National d'Histoire Naturelle, Paris.
Stockholm—Naturhistoriska Riksmuseum, Stockholm.
Turin—Istituto e Museo di Zoologia, Torino.
Uppsala—Zoologiska Institutionen, Uppsala Universitet, Uppsala.

Measurements and abbreviations of measurements used in this paper follow those of Dirsh (1953).

Abbreviations used in the phallic complex figures are as follows: Ac—arch of cingulum; Ap—apical valve of penis; Apd—apodeme of cingulum; Bp—basal valve of penis; Cv—cingular valve; Dp—dorsal process of cingulum; Ejd—ejaculatory duct; Ejs—ejaculatory sac; Gpr—gonopore process; Rm—ramus of cingulum; Sps—spermatophore sac.

The opportunity is taken here to thank the Keeper of Entomology of the British Museum (Natural History) for allowing me to study the mass of material in his care; Dr. T. H. C. Taylor for editing the manuscript; and the following colleagues for loans and information concerning type material; Professor G. Ya. Bei-Bienko, Leningrad; Professor J. van Boven, Leuven; Dr. M. Descamps, Paris; Dr. K. K. Günther, Berlin; Dr. L. Hedström, Uppsala; Professor J. O. Hüsing, Halle (Saale); Dr. K. H. L. Key, Canberra; Professor E. Morales—Agacino, Madrid; the late Dr. B. Hanson, Stockholm; Dr. B. Petersen, Copenhagen; Professor M. Salfi, Naples; and Dr. F. Willemse, Eygelshoven.

BIOLOGY

There is no major study on the biology of the species of *Aiolopus* available, but many authors have studied specific items of the biology of the more common species such as *A. thalassinus* and *A. simulatrix* (as *A. savignyi*).

Chesler (1938) studied the life history and described the immature stages of *A. thalassinus* in the Transvaal, and Hafez *et al.* (1962*a*) studied the same species in Egypt, both papers reporting that successful digging and oviposition took place in wet soil. Khalifa (1956), studying the egg-pods of *A. thalassinus* and *A. simulatrix*, mentions that a higher percentage of *simulatrix* than of *thalassinus* will oviposit on dry soil and the eggs of both species will develop without contact water as, provided they are in an atmosphere of 100 % humidity, they can absorb enough moisture from the atmosphere for development.

Zimin (1938) describes egg-laying and the egg-pods of *thalassinus* in southern Russia; Chapman & Robertson (1958) describe the egg-pods of *thalassinus* and *longicornis* in the Rukwa Valley, and Chapman (1961) describes those of *thalassinus* from Ghana; and Descamps & Wintrebert (1967) describe the egg-pods, eggs, copulation and oviposition of *A. rodericensis* (Butler) and suggest three to four generations per year for this species in S.W. Madagascar.

Joyce (1952) records that *A. simulatrix* in the Sudan overwinters as adults in soil cracks and the present author confirms the presence of this species in soil cracks in the Sudan at the onset of winter. Khalifa (1956) states that in Egypt, where the winter is more severe, *simulatrix* overwinters in the egg stage, but *thalassinus* breeds throughout the year. This latter fact is verified for other regions by Nolte (1939) and Chapman (1962). Roffey (1965) suggests that, in Thailand, *A. thalassinus tamulus* undergoes more than one generation per year and does not overwinter in the egg stage.

Joyce (1952 and 1954), studying the general biology of *simulatrix* in the Sudan, describes the formation of loose swarms and seasonal migration by this species. Khalifa (1956) states that both *thalassinus* and *simulatrix* will invade crop areas from fallow land and Hafez *et al.* (1963) describe experiments showing movement of *thalassinus* from *Cynodon* to irrigated areas for the higher relative humidity rather than for food preference, the female showing a better reaction to relative humidity than the male. Rungs (1938) describes *thalassinus* swarming in Morocco. Davey *et al.* (1959) suggest large scale migrations between seasonal habitats for *thalassinus* in Mali.

Phipps (1959 and 1966) discusses the biology of *thalassinus* (as *Aiolopus* sp.) and *longicornis* with special emphasis on egg production, and Robertson & Chapman (1962) give short biological notes on *longicornis*, *femoralis* and *thalassinus* in the Rukwa Valley.

Hafez *et al.* (1962), discussing the general ecology and biology of *thalassinus* in Egypt, showed the ability of both hoppers and adults to mature effectively on a variety of food crops and on *Cynodon* but found both cotton and lentil refused or detrimental to growth, and the same authors (Hafez *et al.*, 1963*a*) describe the possible humidity and temperature receptors in *thalassinus*.

Nolte (1939), discussing the colour forms and chromosome complex of *thalassinus* in Transvaal, considers this species a grassland type with two basic colour forms, green and light brown; the latter was by far the more common and the former was not controlled in colour by environment alone since most, but not all, specimens of it darkened to brown on maturity.

Very little is known of the natural enemies of *Aiolopus* spp., but the literature is reviewed by Greathead (1963) and the same author (1966) records *Blaesoxipha anceps* Vill. parasitizing *simulatrix* (as *savignyi*) in Eritrea. Chapman (1962) records rearing dipterous larvae from *Aiolopus* sp., Descamps & Wintrebert (1967) record *Scelio* sp. parasitizing eggs of *rodericensis* in Madagascar; and the present author can record *thalassinus* killed by *Entomophthora* sp. (probably *grylli*) in Rhodesia.

Of the published economic notes on the genus perhaps the most significant are those relating to *simulatrix*. Joyce (1952) gives an account of the damage caused by this species (as *savignyi*) to millet on a mechanized crop scheme in the Sudan. Coates (1893) records *Epacromia dorsalis* (Thunb.) and *E. tricoloripes* Burm. damaging various crops in many parts of India. The record of *tricoloripes* probably refers to *A. thalassinus tamulus* (Fabricius) and that of *dorsalis* refers to *simulatrix simulatrix* as the figure given, and copied by Fletcher (1914 : 525), is obviously of *simulatrix*. Coates (1893) records *simulatrix* (as *dorsalis*) causing serious damage to summer rain crops, particularly millet, in the Upper Sind Frontier district; and Barlow (1900) records *simulatrix* (as *dorsalis*) damaging young wheat seedlings in the Ahmednagar district of India.

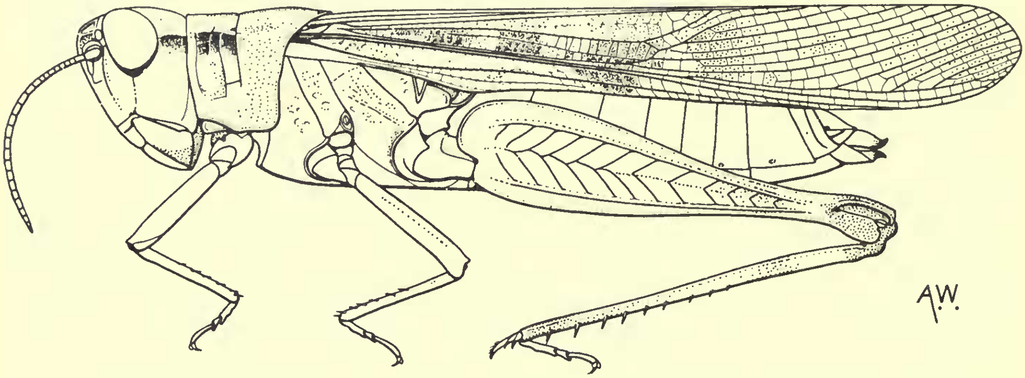


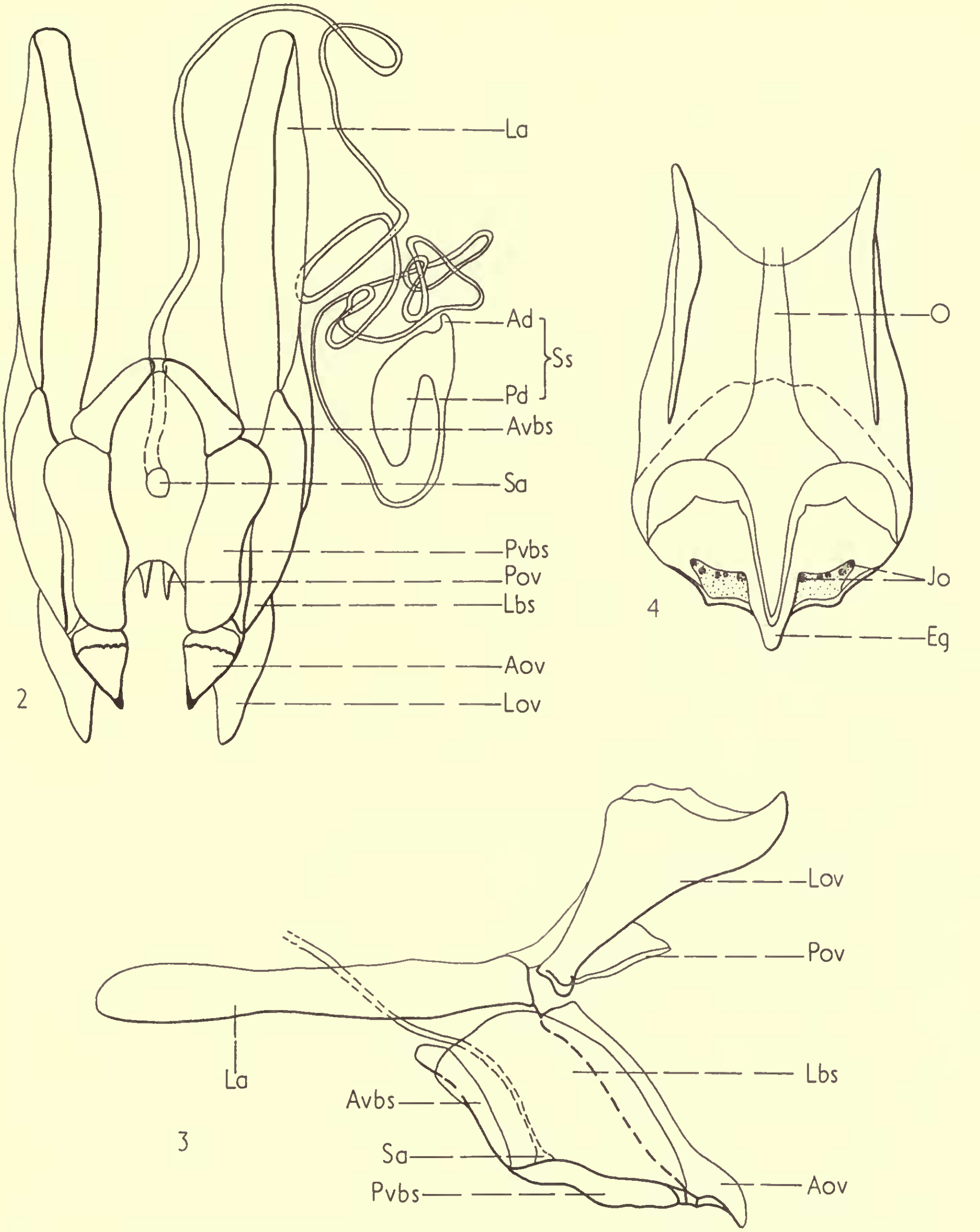
Fig. 1. *Aiolopus thalassinus thalassinus* (Fabr.). Entire insect, ♀, lateral view. (After Dirsh, 1965).

TAXONOMIC TREATMENT

Until the present revision, the genus *Aiolopus* has never been considered in its entirety and earlier workers, e.g. Finot (1895 : 421), Brunner von Wattenwyl (1882 : 145), I. Bolivar (1898 : 69), Innes (1929 : 30) and Chopard (1943 : 287), were only concerned with separating species in particular areas. Consequently no set of characters has been tested for the genus as a whole.

Bei-Bienko (in Bei-Bienko & Mishchenko 1951 : 567) gives the most complete key to species previously published; in it five species are separated. He used a fairly large combination of characters, the genus being basically divided up on the width of the hind femur in relation to the width of the tegmen, coupled with the form of the pronotum. The present author has found the femoro-tegminal character unreliable as, for any species, the width of the tegmen varies directly with its length but by no means always directly with the width of the hind femur.

The width of the hind femur relative to its length can be used as a rough guide to species-groups, although there are overlaps between those with narrow hind femora, e.g. *A. thalassinus*, those with hind femora of medium thickness, e.g. *A. longicornis*,



FIGS. 2–4. *Aiolopus thalassinus thalassinus* (Fabr.) ♀ genitalia. 2, ovipositor, ventral view; 3, same, lateral view; 4, subgenital plate, dorsal view. Ad—apical diverticulum of spermatheca; Aov—anterior (ventral) ovipositor valve; Avbs—anterior ventral basivalvular sclerite; Eg—egg guide; Jo—Jannone's organs; La—lateral apodeme; Lbs—lateral apodeme; Lbs—lateral basivalvular sclerite; Lov—lateral (dorsal) ovipositor valve; O—oviduct; Pd—preapical diverticulum of spermatheca; Pov—posterior (inner) ovipositor valve; Pvbs—posterior ventral basivalvular sclerite; Sa—spermathecal aperture; Ss—spermathecal sac.

and the species with broad hind femora, e.g. *A. strepens*. However, when this character is coupled with other characters such as the form of the pronotum (Text-figs. 11–20), the frontal ridge (Text-figs. 21–29) and the length of the hind tibia relative to the hind femur (Text-figs. 5–8), the species are more clearly defined.

Identification of subspecies is more difficult as the characters are geographically significant trends such as the colouration of the hind tibia and the relative proportions of the hind femur and tegmen. The latter character is used to separate *A. thalassinus thalassinus* from *A. th. rodericensis* and *A. simulatrix simulatrix* from *A. s. femoralis* by comparison of the ratio of the length of the tegmen over the length of the pronotum (E/P) with the ratio of the length of the hind femur over its maximum width (FL/FW) (Text-figs. 37–38, 90–91).

The phallic complex appears to be of little use in separating species because, as in many other Acridinae genera, it is extremely similar in all the species and can only be used as a loose supporting indication of specific identity.

The female subgenital plate (Text-fig. 4) and ovipositor (Text-figs. 2–3) are very uniform within the genus and the spermatheca has a similar range of variation in most species.

AIOLOPUS Fieber, 1853

Aiolopus Fieber, 1853 : 100.
Epacromia Fischer, 1853 : 360; Rehn, 1902 : 317.
Aeolopus [*sic*] Kirby, 1910 : 190.
Aeoloptilus Bei-Bienko, 1966 : 1793, **syn. n.**

Type-species: *Gryllus thalassinus* Fabricius, 1781; Kirby, 1910 : 190.

Medium size. Integument finely or moderately coarsely pitted. Antenna filiform, slightly shorter than, as long as, or longer than combined lengths of head and pronotum. Fastigium of vertex pentagonal, slightly longer than wide, moderately concave with well defined margins, forward angle acute or broadly rounded, fastigial foveolae trapezoid or rectangular, if former then narrowing forwards, shallow, normally with well defined margins; frons oblique; frontal ridge in some species slightly convex, in others flat or, sometimes weakly concave at and below median ocellus, if latter then marginal carinulae present but poorly developed. Eyes oval, long axis always vertical. Pronotum from slightly tectiform to slightly saddle-shaped, constricted at junction of prozona and metazona with former sometimes constricted medially; median carina linear, crossed only by posterior sulcus; raised lateral carinae absent in most species, rarely present in prozona, lateral " shoulders " often present; metazona longer than prozona, with obtuseangular posterior margin; mesosternal interspace as long as wide or slightly wider than long, rectangular or trapezoid and widening posteriorly. Tegmen and hind wings fully developed; intercalary vein of medial area of tegmen well developed and serrate at least in male, continuing to distal apex of medial area; membrane of tegmen semi-transparent with moderately sparse reticulation. Hind femur slender or broad, apical lobes rounded; hind tibia as long as or shorter than hind femur, apical spurs not specialized; arolium of medium size or small. Male supra-anal plate rounded-triangular, with moderately elongated, subangular posterior apex; cercus narrow-conical with subobtuse apex; subgenital plate short, subconical, with rounded apex; epiphallus with moderately narrow bridge, curved ancorae and bilobed lophi; ectophallic membrane sclerotized and forming sheath below apical penis valves; cingulum with horseshoe-shaped arch bearing moderately long apodemes and very weak or more strongly developed dorsal processes, from ramus lateral processes extend backwards on each side above cingular valves, latter crescent-shaped in profile and slightly expanded medially; cingular valves less sclerotized than apical penis valves, elipsoid in profile, with acute apices; basal penis valves with moderately or well developed lateral expansions which are rarely recurved; flexure narrow; apical penis valves very narrow-triangular in profile, with acute apices. Ovipositor of female short; valves moderately robust, with curved apices, lower valve with small externo-ventral tooth; spermatheca with sac-like preapical and short finger-like apical diverticula.

When this genus was first erected by Fieber as *Aiolopus* and later by Fischer as *Epacromia* neither author designated a type-species but both gave a list of contained species for their genera. Kirby (1910) designated *Gryllus thalassinus* Fabricius as the type-species for the genus *Aiolopus* after Rehn's (1902) synonymy of Fieber's and Fischer's genera. As *G. thalassinus* was listed by both Fieber and Fischer in their genera, Rehn's synonymy can be accepted.

Bei-Bienko (1966) erected the genus *Aeoloptilus* for a new species *carinatus* Bei-Bienko (1966), described from Komodo Island. The present author has been able to examine male and female paratypes of this species and a female specimen from Sumba Island. Bei-Bienko separates *Aeoloptilus carinatus* from *Aiolopus* by the presence of lateral pronotal carinae, the weak and elongate-oval fastigial foveolae and the shape of the intercalary vein of the medial area of the tegmen. As will be seen below, lateral pronotal carinae are not good diagnostic features in *Aiolopus*, as they may or may not be very weakly developed in *A. thalassinus tamulus* (Fabricius). The fastigial foveolae in *carinatus* appear to be of the *Aiolopus* type but weakly developed. The intercalary vein of the medial area of the tegmen in *carinatus* shows no significant difference in shape or position from that of *A. thalassinus* (Fabricius). Furthermore the male phallic complex of *carinatus* is extremely similar to that of *A. th. tamulus* (Fabricius). For these reasons the genus *Aeoloptilus* Bei-Bienko is synonymized with *Aiolopus*, but the type-species, *carinatus*, is kept distinct for reasons discussed below (p. 334).

Aiolopus is placed naturally in the oedipodine half of the subfamily Acridinae where it may be distinguished by the following combination of characters: filiform antenna, trapezoid or rectangular fastigial foveolae, weakly tectiform or saddle-shaped dorsum of pronotum, lateral pronotal carinae absent or weakly present only in prozona, metazona of pronotum longer than prozona and its posterior margin obtuseangular, mesosternal interspace as wide as or wider than long, intercalary vein of medial area of tegmen extending to distal apex of medial area, hind femur with lower outer area not expanded, hind tibia not expanded and its apical spurs not specialized, epiphallus with simple bilobed lophi, male subgenital plate subconical, and apical penis valves short.

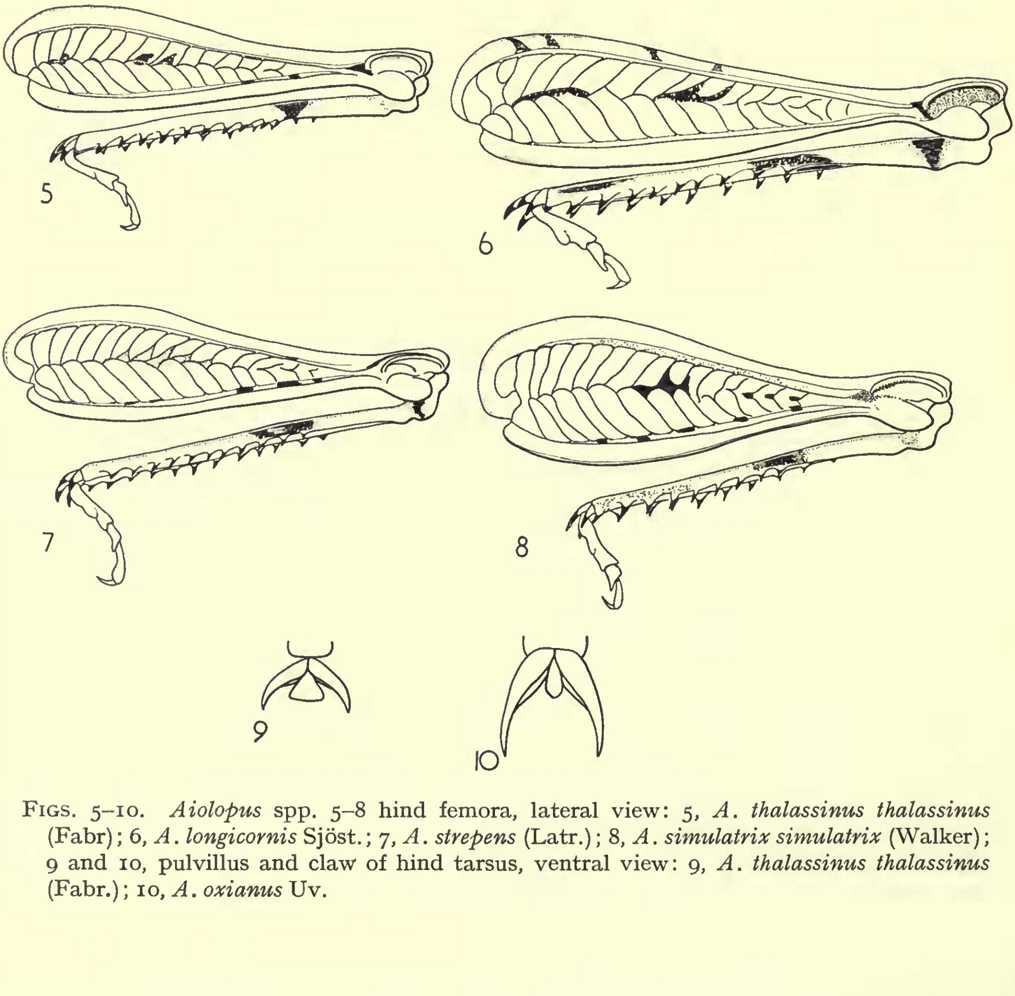
The genus is widely distributed throughout the Old World south of latitude 50° N. and north of latitude 40° S., extending westwards to the Cape Verde Islands and eastwards to the Samoan Islands. Its distribution in the Indian Ocean region is of particular interest. Two species are present, *A. thalassinus* and *A. simulatrix*, both on the east coast of Africa and the west coast of India, but *thalassinus* is not found east of the Seychelles Islands and *simulatrix* is not found west of Coetivy Island. This possibly suggests invasion of the region by the genus during different geological times.

Key to Species and Subspecies

1 Hind tibia considerably shorter than hind femur, with a maximum of nine outer and ten inner spines (Text-fig. 8); frontal ridge coarsely and densely pitted, without lateral carinulae, with margins converging strongly just below fastigium (Text-fig. 27); prozona of pronotum gradually sloping away on each side of median carina and without trace of lateral " shoulders " (Text-figs. 15–16); hind femur broad or very broad 2

– Hind tibia as long as or only slightly shorter than hind femur, with at least nine to twelve outer and ten to thirteen inner spines (Text-figs. 5–7); frontal ridge more sparsely pitted, if coarsely pitted then not narrowing strongly just below fastigium (Text-figs. 21–26, 28–29); pronotum almost flat or slightly saddle-shaped, prozona either with pattern suggesting presence of lateral carinae or almost flat dorsally and without median constriction (Text-figs. 11–14, 17–20); hind femur narrow or broad 3

2 Hind femur very broad, ratio of length to width (FL/FW) barely 3·0; tegmen hardly surpassing tip of hind femur, ratio of length of tegmen over length of pronotum (E/P) normally between 3·7 and 4·5. S.W. Tanzania, Zambia and South Africa ***simulatrix femoralis*** Uvarov (p. 325)

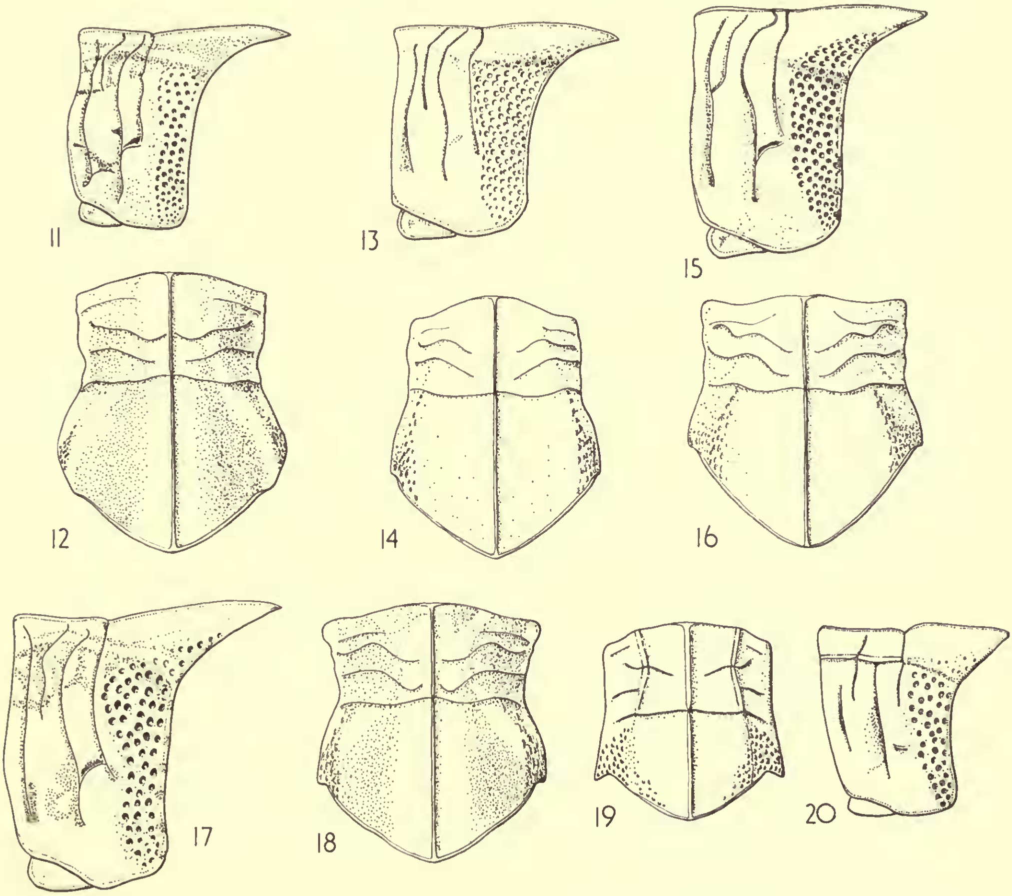


Figs. 5–10. *Aiolopus* spp. 5–8 hind femora, lateral view: 5, *A. thalassinus thalassinus* (Fabr); 6, *A. longicornis* Sjöst.; 7, *A. strepens* (Latr.); 8, *A. simulatrix simulatrix* (Walker); 9 and 10, pulvillus and claw of hind tarsus, ventral view: 9, *A. thalassinus thalassinus* (Fabr.); 10, *A. oxianus* Uv.

– Hind femur slightly less broad, ratio of length to width (FL/FW) about 3·4; tegmen well surpassing tip of hind femur, ratio of length of tegmen over length of pronotum (E/P) normally between 4·5 and 5·3. Northwards from E. Tanzania to eastern Mediterranan region, Arabian peninsula, Middle East, India, Burma, Islands of Indian Ocean westwards to Seychelles. . . ***simulatrix simulatrix*** (Walker) (p. 320)

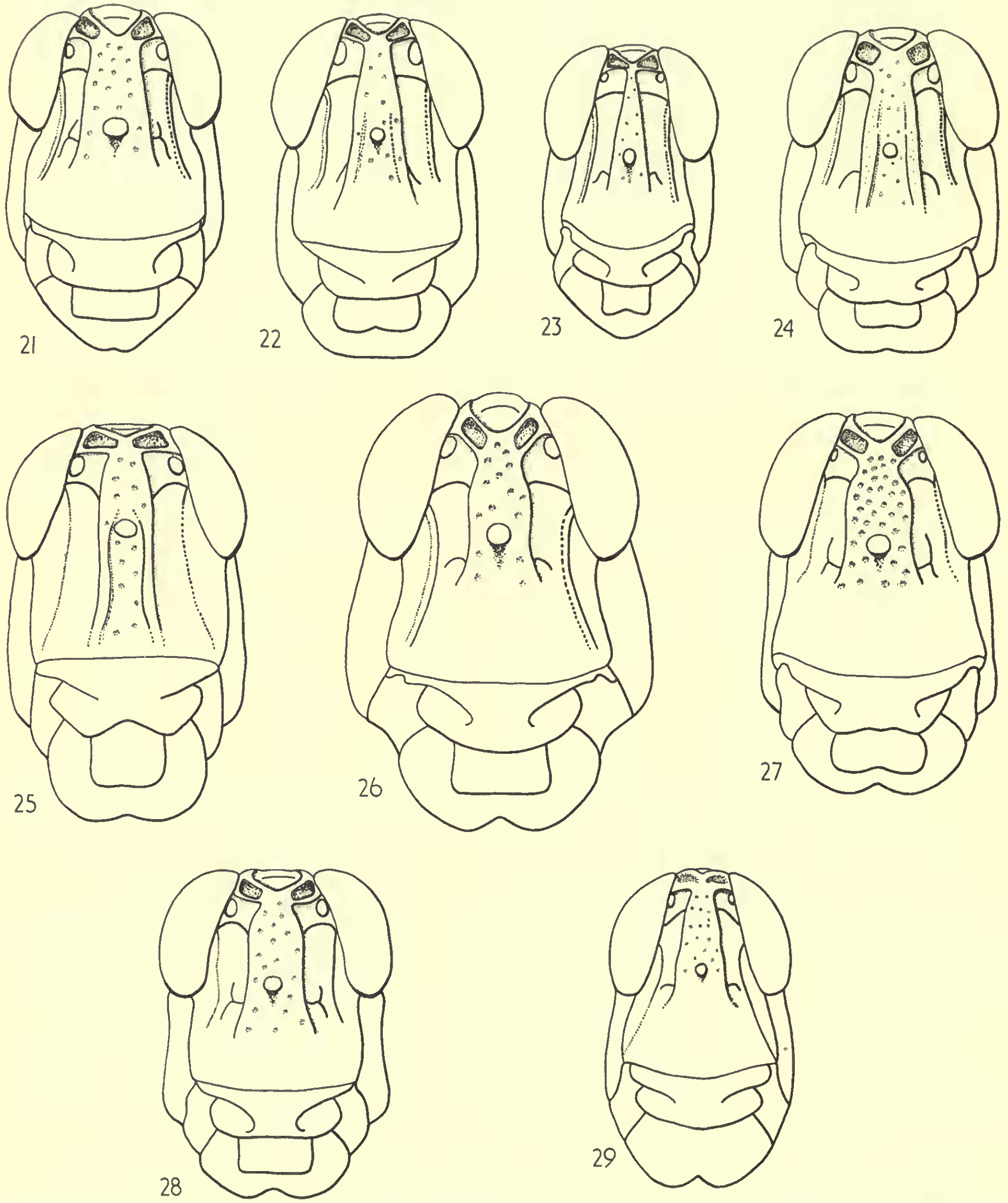
3 Pronotum almost flat dorsally and without constriction in prozona (Text-figs. 13–14); hind femur broad, ratio of length to width (FL/FW) about 3·4 (Text-fig. 7); hind tibia with ten outer and eleven inner spines, red except for basal quarter; maximum width of face (C) normally less than maximum width of hind femur (FW); antennae shorter than combined lengths of head and pronotum. Southern Palaearctic region westwards to Persian Gulf. . . . . . . ***strepens*** (Latreille) (p. 327)

– Pronotum slightly saddle-shaped and with median prozonal constriction (Text-figs. 11–12, 17–20); hind femur narrow or broad, if latter then only with nine outer



Figs. 11–20. *Aiolopus* spp., pronota. 11, *A. thalassinus thalassinus* (Fabr.), lateral view; 12, same, dorsal view; 13, *A. strepens* (Latr.), lateral view; 14. same, dorsal view; 15, *A. simulatrix simulatrix* (Walker), lateral view; 16, same, dorsal view; 17, *A. longicornis* Sjöst., lateral view; 18, same, dorsal view; 19, *A. carinatus* (Bei-Bienko), dorsal view; 20, same, lateral view.

and ten inner spines (Text-figs. 5–6); maximum width of face (C) normally greater than maximum width of hind femur (FW); antennae at least as long as combined lengths of head and pronotum 4



FIGS. 21–29. *Aiolopus* spp., heads, anterior view. 21, *A. thalassinus thalassinus* (Fabr.), ♀; 22, *A. thalassinus tamulus* (Fabr.), ♀; 23, *A. thalassinus tamulus* (Fabr.), ♂ from Christmas Island; 24, *A. thalassinus dubius* (Willemse), ♀; 25, *A. oxianus* Uv., ♀; 26, *A. longicornis* Sjöst., ♀; 27, *A. simulatrix simulatrix* (Walker), ♀; 28, *A. strepens* (Latr.), ♀; 29, *A. carinatus* (Bei-Bienko), ♀.

4 Arolium of hind tarsus very small, about one quarter the length of claw (Text-fig. 10); frontal ridge weakly sulcate and with parallel, obtuse, lateral carinulae which extend almost to base of frons (Text-fig. 25). Central Asia **oxianus** Uvarov (p. 330)

– Arolium of hind tarsus larger, about half length of claw (Text-fig. 9); frontal ridge normally flat, if sulcate then lateral carinulae gradually converging upwards (Text-figs. 21–24, 29) 5

5 Fastigial foveolae weak, ovoid, with poorly developed margins (Text-fig. 29); prozona of pronotum with lateral carinae moderately developed, parallel or weakly diverging anteriorly (Text-figs. 19–20); hind tibia with twelve outer and twelve or thirteen inner spines. Komodo and Sumba Islands. **carinatus** (Bei-Bienko) (p. 332)

– Fastigial foveolae rectangular or trapezoid, with well developed margins (Text-figs. 21–24); prozona of pronotum with lateral carinae absent or very weakly developed (Text-figs. 11–12); hind tibia with nine or ten outer and ten or eleven inner spines 6

6 Antennae very long, when extended backwards almost reaching base of hind femur; face broad (Text-fig. 26), ratio of length of pronotum over maximum width of head (P/C) about 1·05; large species with very prominent criss-cross pattern on dorsum of pronotum (Text-figs. 17–18); hind femur of medium thickness. East Africa, Lake Chad . . . . **longicornis** Sjöstedt (p. 334)

– Antennae not longer than combined lengths of head and pronotum; face narrower, ratio of length of pronotum to maximum width of head (P/C) about 1·20 but if much less then pronotum short and broad and fastigial foveolae not much longer than wide 7

7 Fastigial foveolae broadly trapezoid, hardly one and a half times longer than wide; hind tibia not black ventrally; pronotum short and broad; hind femur broad, ratio of length to width (FL/FW) less than 3·7. East and southern Africa **meruensis** Sjöstedt (p. 336)

– Fastigial foveolae narrowly trapezoid, about twice as long as broad, but if less then hind tibia bluish in apical two thirds or almost completely black ventrally; pronotum narrower; hind femur of medium thickness or narrow, ratio of length to width (FL/FW) more than 3·5 8

8 Ventral surface of hind tibia completely black or dark brown in apical three quarters; fastigial foveolae rectangular and about one and a half times longer than wide (Text-fig. 24). Polynesia eastwards to Samoa . . **thalassinus dubius** (Willemse) (p. 351)

– Ventral surface of hind tibia with dark colouration, if present, broadly interrupted with reddish, bluish or ochraceous band; fastigial foveolae narrowly trapezoid, about twice as long as wide (Text-figs. 21–23) 9

9 Hind femur of medium thickness, ratio of length to width (FL/FW) between 3·4 and 4·0; tegmen shorter, ratio of length of tegmen over length of pronotum (E/P) between 4·1 and 4·9; hind tibia without red colouration Madagascan subregion west of Comoro Islands. . . **thalassinus rodericensis** (Butler) (p. 343)

– Hind femur narrower, ratio of length to width 4·0 or more; tegmen longer, ratio of length of tegmen over length of pronotum (E/P) 4·7–5·5. Palaearctic, Ethiopian and Oriental regions 10

10 Frontal ridge narrow, gradually and continuously narrowing upwards (Text-figs. 22–23); hind tibia with red colouration, if present, broadly separated from basal black band by bluish grey band. East India and Ceylon eastwards to Australia. **thalassinus tamulus** (Fabricius) (p. 347)

– Frontal ridge broad, with lateral margins only slightly convergent upwards to fastigium (Text-fig. 21); hind tibia with apical red colouration, if present, narrowly separated from basal black band by ochraceous band. Ethiopian region, N. and W. India westwards to Palaearctic region. **thalassinus thalassinus** (Fabricius) (p. 340)

Aiolopus simulatrix (Walker, 1870)

This species is divided into two subspecies which are described and discussed below.

Aiolopus simulatrix simulatrix (Walker, 1870) **stat. n.**

(Text-figs. 8, 15, 16, 27, 30–39)

Epacromia simulatrix Walker, 1870 : 773.
Heteropternis (?) *savignyi* Krauss, 1890 : 262, **syn. n.**
Epacromia affinis I. Bolivar, 1902 : 600, **syn. n.**
Acrotylus simulatrix (Walker, 1870) Kirby, 1910 : 267.
Aeolopus laticosta I. Bolivar, 1912 : 270, **syn. n.**
Aeolopus strepens deserticola Uvarov, 1922 : 358, **syn. n.**

Type locality. South Hindustan; type ♂ deposited in the BM(NH).

Redescription. ♂. Integument more strongly rugulose than the other species in the genus. Antenna as long as combined lengths of head and pronotum with twenty-two to twenty-four segments. Fastigium of vertex pentagonal, slightly longer than wide, moderately concave with well defined margins, forward angle narrowly rounded; fastigial foveolae rectangular, shallow, coarsely pitted, with moderately well defined margins, lower margin often very weak; frontal ridge wide, coarsely and densely pitted (Text-fig. 27), with parallel margins along most of length but narrowing strongly just below fastigium. Eye oval, about one and a half times as high as wide and almost twice as high as length of subocular groove. Pronotum relatively narrow (Text-figs. 15–16); prozona cylindrical above, with very slight median constriction; metazona rather flat, with obtuse angular posterior margin; median longitudinal carina stronger in prozona than in metazona; lateral plate of pronotum higher than wide; mesosternal interspace wider than long, trapezoid, slightly widening posteriorly. Tegmen relatively long, E/P ratio about 4·9. Hind femur broad, ratio of length to width about 3·5; hind tibia shorter than hind femur (Text-fig. 8), with nine outer and ten inner spines, inner apical spurs slightly less than twice as long as outer pair; arolium almost half length of claw. Phallic complex (Text-figs. 30–33) with zygoma of cingulum with small dorsal processes and short apodemes; basal valves of penis with small lateral expansions which are not recurved posteriorly.

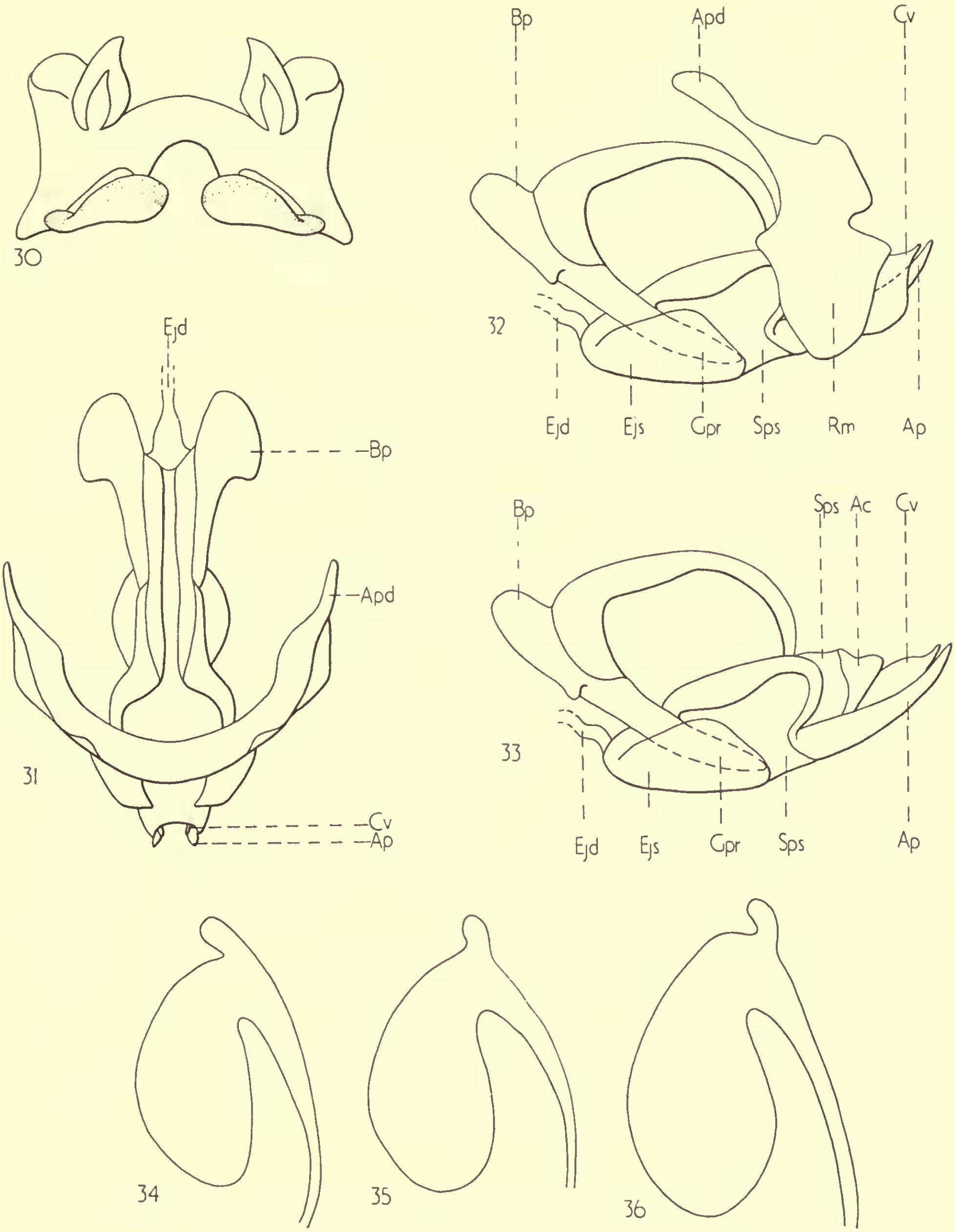
General colouration mid-brown with ochraceous (or green) and blackish markings; pronotum often unicolorously brown or rarely greenish, sometimes with weak ochraceous X-shaped pattern on dorsum; tegmen with two ochraceous transverse fasciae which extend from anterior margin to first vannal vein (Snodgrass, 1935), the proximal fascia narrows somewhat posteriorly, apex of tegmen mottled; hind wing hyaline, sometimes pale yellow basally, apex slightly darkened; hind femur with two dark spots in upper outer area, inner surface ochraceous with two incomplete dark fasciae, lower inner area often reddish, hind " knee " blackish; hind tibia narrowly black basally, followed by broad ochraceous ring and with broad blackish or grey ring medially, apical third reddish or ochraceous.

♀. Larger and more robust than male. Spermatheca as in Text-figs. 34–36.

Measurements (mm.). Length of body, ♂ 16·9–26·0, ♀ 21·0–30·8. Length of pronotum. ♂ 3·2–4·5, ♀ 3·9–5·2. Length of tegmen, ♂ 16·1–21·9, ♀ 18·5–26·6. Length of hind femur, ♂ 9·5–14·5, ♀ 11·0–14·6. Maximum width of hind femur, ♂ 2·7–4·3, ♀3·3–4·6. Maximum width of head (C), ♂ 2·9–4·1, ♀ 3·6–5·0.

Ratios (forty males and forty females measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·00	1·11	1·20	3·27	3·48	3·65	4·75	4·93	5·34	1·54	1·69	1·87
♀	1·00	1·09	1·21	3·13	3·43	3·78	4·46	4·93	5·31	1·54	1·72	1·82



FIGS. 30–36. *A. simulatrix simulatrix* (Walker), genitalia. 30, ♂ epiphallus; 31, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 32, same, lateral view; 33, ♂ endophallus, lateral view; 34, ♀ spermatheca of specimen from Tanzania; 35, same, from Jordan; 36, same, from S. India.

Discussion. This subspecies is quite variable in size, general colouration, relative width of hind femur and relative length of tegmen. The last two characters show a very general tendency to vary according to geographical distribution, the trends being towards slightly broader hind femora and shorter tegmina as the species extends southwards down the eastern half of the African continent and narrower hind femora and longer tegmina as the species extends southwards down the Indian peninsula. The former trend reaches its culmination in southern Africa, and the forms involved in it are here regarded as a separate subspecies *A. simulatrix femoralis* Uvarov; the latter trend culminates in populations on the Maldive, Chagos and Seychelles Islands. By comparing the ratios of length to width of the hind femur against the ratio of the length of the tegmen over the length of the pronotum these trends may be demonstrated, as in Text-figs. 37–38.

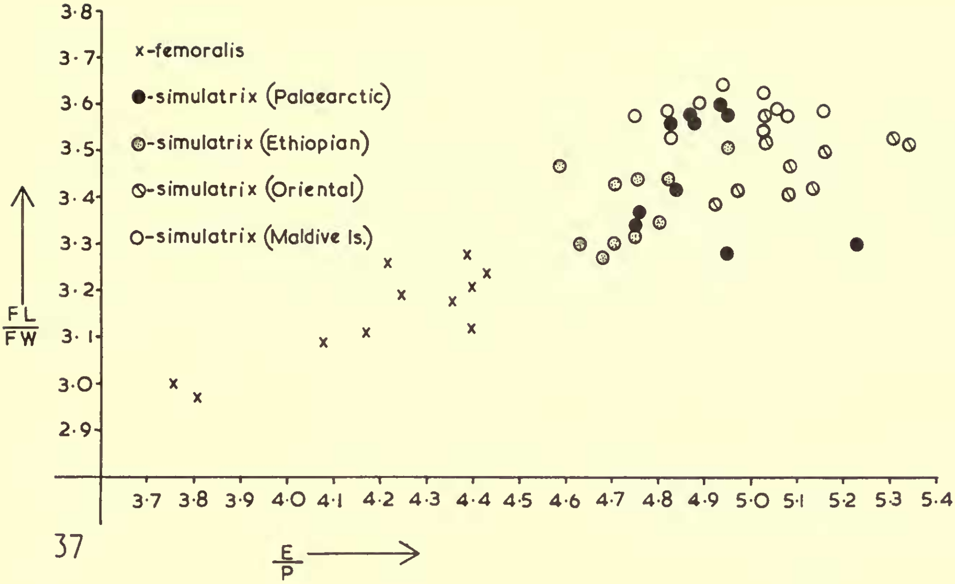
A. simulatrix simulatrix may be readily distinguished from other species in the genus by the form of the frontal ridge, pronotum and hind leg.

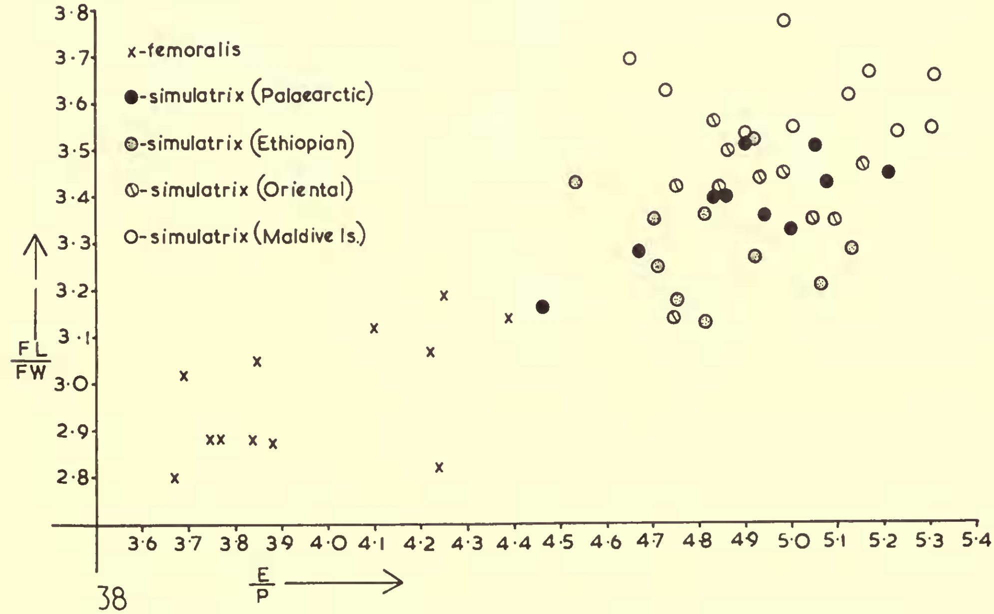
Up to the present this species has been recorded in the literature as *A. savignyi* (Krauss), the type of which species does not exist and is known only as a drawing in Savigny's " Descriptions de l'Egypt " (1809–1813 : 182, pl. 6, fig. 16), from which a specific description was made by Krauss (1890 : 262) as *Heteropternis* (?) *savignyi*. The original drawing is not particularly diagnostic and as the specimen from which the drawing was made is no longer in existence, the true identity of the name *savignyi* is open to subjective conclusions. Storey (1919 : 55) synonymized *H. savignyi* with *Epacromia strepens* (Latreille) but in all probability Storey's *E. strepens* was the same species as *A. savignyi* of other authors. Uvarov (1942 : 337) firmly established the synonymy of *H.* (?) *savignyi* with *Epacromia affinis* I. Bolivar (1902) and *A. strepens affinis* Uvarov (1924 : 21). In order not to confuse the literature even further the present author accepts Uvarov's interpretation of Savigny's drawing as being the species which has, up to the present, been named *A. savignyi* (Krauss).

However the type male of *Epacromia simulatrix* Walker, 1870 represents the same species and therefore Krauss's name should fall into synonymy. The use of the older Walker name is a strict application of the law of priority but does involve the use of a *nomen oblitum*, as it has not been used as a senior synonym in the primary zoological literature since its original publication in 1870; it has been used, in the present author's opinion quite wrongly, as a junior synonym by Kirby (1914 : 122) and I. Bolivar (1918 : 382). The usage of Walker's name is proposed for the two following reasons: firstly, the name in common usage, i.e. *savignyi* Krauss, is based upon the description of a drawing of a specimen which is now lost and which is therefore open to subjective interpretation; and secondly, the older *nomen oblitum* i.e. *simulatrix* Walker, is based upon the description of an objective type specimen which is still in existence.

Aeolopus strepens deserticola Uvarov is synonymized here, since the male upon which Uvarov based the subspecies falls well within the range of individual variation of the nominate subspecies. The type male bears the locality label "KAZVIN, N.W. Iran " and is deposited in the BM(NH).

Aeolopus laticosta I. Bolivar, described from the Chagos Islands in the Indian Ocean, represents an extreme form of the nominate subspecies which, however, cannot be





FIGS. 37, 38. *A. simulatrix* subspp., scatter diagrams comparing values of FL/FW against E/P. 37, males; 38, females.

regarded as distinct as it merges very well with the more typical form on the Indian mainland through populations on the Maldive and Laccadive Islands. The lectotype male, bearing the locality label " Diego Garcia, Chagos Is. ", was selected by Dirsh (1963) and is deposited in BM(NH).

Epacromia affinis I. Bolivar was described from a male and female from South India. The male is here selected as LECTOTYPE and bears the following data: " Madure, P. Pantel, *E. affinis* "; it is deposited in Madrid.

Distribution (Text-fig. 39). From the seven hundred and thirty-nine specimens of this subspecies examined the following distributional conclusions are made:

TANZANIA, March to April, July, December to January; KENYA, January to June; SOMALIA, June to August, October to November, January; FRENCH SOMALILAND, August; ETHIOPIA, February to April, July, November to December; SUDAN, May

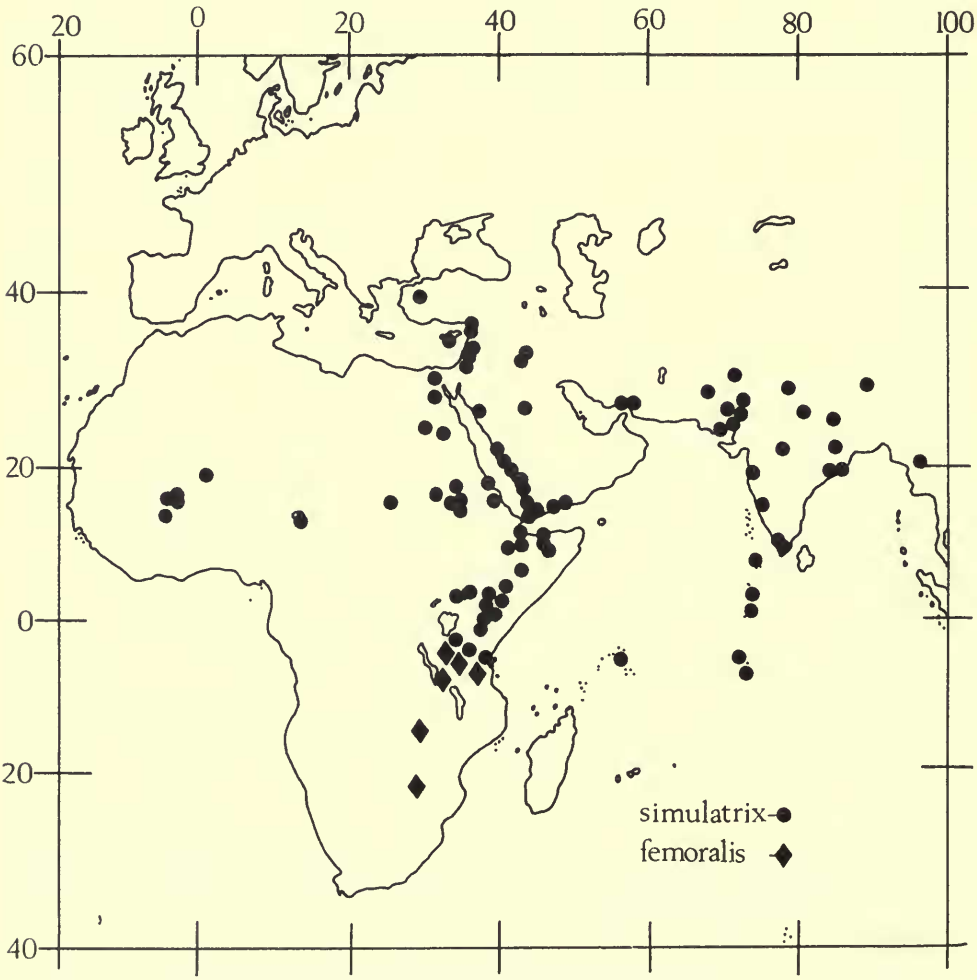


FIG. 39. *A. simulatrix* subspp., distribution map.

through to January; NIGERIA, May, July to August, October; SENEGAL, August to September; MALI, June, August to December, March; UNITED ARAB REPUBLIC, May, August to September; SOUTHERN YEMEN, June, August to November; YEMEN, March, June to July, December; SAUDI ARABIA, August through to June; ISRAEL, June, August, October to November; JORDAN, March, May, June, October; SYRIA, August; TURKEY, November; CYPRUS, May, July, September; IRAQ, May to September, December; IRAN, April to June; WEST PAKISTAN, July, September, November; INDIA, June to November, March to April; BURMA, October; LACCADIVE Is., No dates; MALDIVE Is., July to August, October, December to February; CHAGOS Is., May to December; SEYCHELLES, Coetivy, May to December.

Aiolopus simulatrix femoralis Uvarov, 1953 **stat. n.**

(Text-figs. 37–45)

Aiolopus femoralis Uvarov, 1953 : 109, figs. 126–128.

Type locality. Northern Rhodesia: Luano Valley, Chisorwe; type ♂ deposited in the BM(NH).

Differs from the nominate subspecies in the following ways:

♂. Smaller size; tegmen shorter, hardly reaching or just exceeding tip of hind femur, E/P ratio about 4·0; hind femur very broad, about three times longer than maximum width or even broader; hind tibia with normally eight or rarely nine inner and normally nine or rarely ten outer spines; phallic complex (Text-figs. 40–43) very similar to nominate subspecies, but dorsal processes on zygoma of cingulum a little larger and apodemes a little longer, and lateral expansions of basal valves of penis larger and slightly recurved.

♀. Spermatheca as in Text-figs. 44–45.

Measurements (mm.). Length of body, ♂ 16·8–19·9, ♀ 21·3–25·5. Length of pronotum, ♂ 3·6–4·1, ♀ 4·3–5·0. Length of tegmen, ♂ 14·1–17·0, ♀ 15·8–20·2. Length of hind femur, ♂ 9·5–11·4, ♀ 10·9–13·8. Maximum width of hind femur, ♂ 3·1–3·6, ♀ 3·8–4·4. Maximum width of head, ♂ 3·1–3·7, ♀ 4·0–4·6.

Ratios (twelve males and twelve females measured):

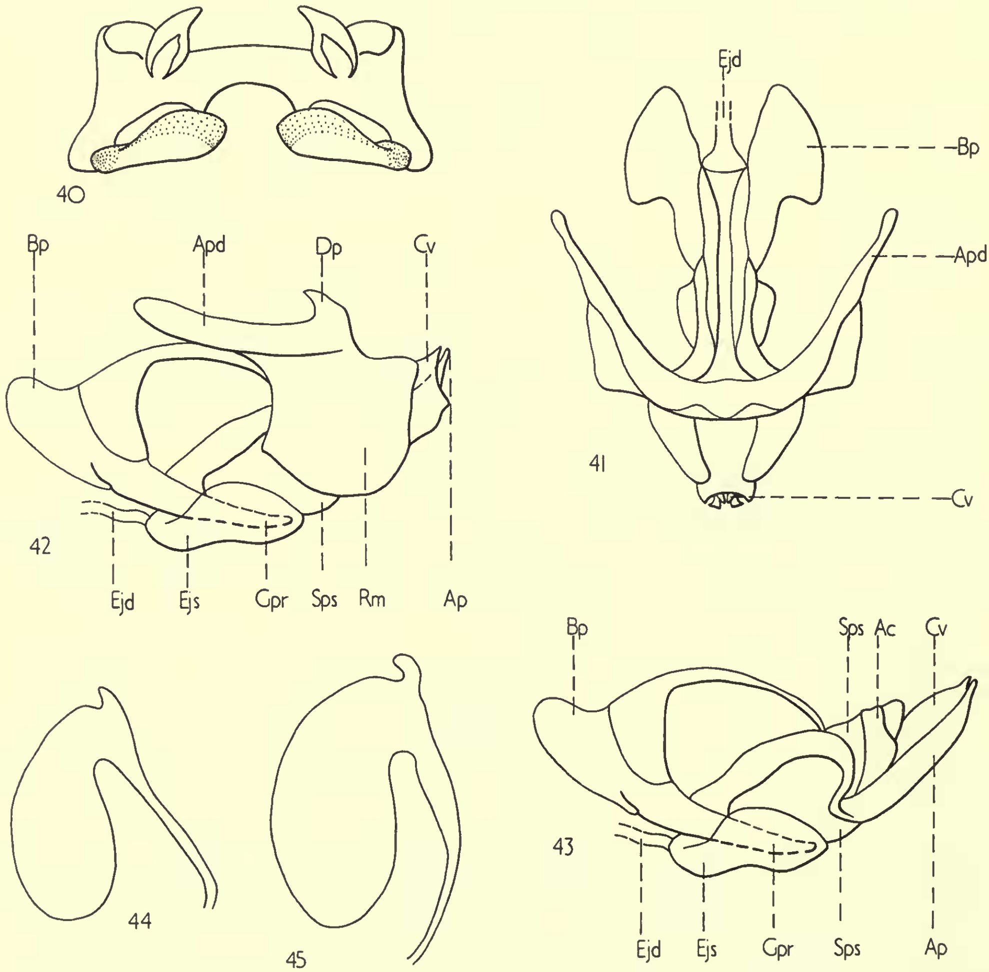
	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·08	1·14	1·18	2·97	3·15	3·28	3·76	4·18	4·43	1·42	1·51	1·58
♀	1·00	1·06	1·14	2·80	2·98	3·19	3·67	3·97	4·39	1·37	1·47	1·58

Discussion. Only a small number of specimens of this subspecies have been examined and variation appears chiefly in size and general colouration. There is a general tendency as the subspecies extends southwards for the hind femur to become relatively thicker and for the number of spines on the hind tibia to decrease from nine outer and ten inner to eight outer and nine inner.

When first described, *femoralis* was considered to be a distinct species and by its broad hind femora and short tegmina the type series would appear to be fairly well distinguished from *simulatrix*. However, specimens from southern Tanzania are less well defined and the specimen examined from South Africa is even more clearly defined than the type series, suggesting a culmination of trends which can be seen in *simulatrix* as it extends southwards down E. Africa. The line of demarkation between the two subspecies in Tanzania coincides fairly well with that between the wooded steppe of the Sudan and of E. Africa and the savanna of south-eastern Africa (see Keay, 1959).

Distribution (Text-fig. 39) (thirteen males and twelve females examined). TANZANIA: Kimamba, iv, 1 ♂; Tumba, i, 2 ♂, 1 ♀; ii, 5 ♂; xii, 1 ♂; Lake Rukwa, v, 1 ♀; C. Rukwa, Lundi Mbuga, xii, 4 ♀; Mshughaa, 35 mls, S.E. of Singida, xii, 1 ♂.

ZAMBIA: Luano Valley, Chisorwe, ii, 3 ♂, 3 ♀; iii, 2 ♀.



FIGS. 40–45. *A. simulatrix femoralis* Uv., genitalia. 40, ♂ epiphallus; 41, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 42, same, lateral view; 43, ♂ endophallus, lateral view; 44, ♀ spermatheca of specimen from Zambia; 45, same, from Tanzania.

SOUTH AFRICA: Transvaal, Zoutpansberg distr., Limpopo R., nr. Kobeenpan, 2,200 ft., iv, " along banks ", 1 ♀.

Aiolopus strepens (Latreille, 1804)

(Text-figs. 7, 13, 14, 28, 46–51)

Acrydium strepens Latreille, 1804 : 154.
Gryllus prasinus Thunberg, 1815 : 239, **syn. n.**
Acridium vittatum Brullé, 1840 : 78, pl. 5, fig. 7; Finot, 1895 : 422.

Type locality. " Environs de Bordeaux "; specimen lost. NEOTYPE (♀) erected bearing the following data: FRANCE: Dordogne, les Eyzies, ix. 1949 (ex. Zeuner coll.), B.M. 1964–194. This specimen was chosen because of its agreement with Latreille's original description and the close proximity of its locality to the original type locality; it is deposited in the BM(NH).

Redescription. ♂. Robust body-form, integument moderately rugulose. Antenna shorter than combined lengths of head and pronotum. Fastigium of vertex pentagonal with forward angle broadly rounded, hardly longer than wide, shallowly concave; fastigial foveolae trapezoid, narrowing forwards, very shallow with lower margin somewhat obliterated, about one and three quarter times as long as maximum width; frontal ridge flat or convex, sparsely pitted, gradually narrowing upwards (Text-fig. 28). Eye ellipsoid, almost twice as high as maximum width and about one and three quarter times as high as length of subocular groove. Dorsum of pronotum subtectiform, rather flat, prozona not constricted medially (Text-fig. 13–14); metazona almost one and three quarter times as long as length of prozona, with narrowly obtuseangular posterior margin; lateral plate of pronotum higher than wide; mesosternal interspace rectangular, slightly broader than long. Tegmen short and broad, normally only slightly exceeding tip of hind femur. Hind femur broad, about 3·3 times as long as maximum width and always broader than maximum width of head; hind tibia as long as hind femur (Text-fig. 7), with ten outer and normally eleven inner spines; inner apical spurs slightly more than one and a half times as long as outer pair; arolium about half length of claw. Supra-anal plate, cercus and subgenital plate normal for genus. Phallic complex (Text-figs. 46–49) with zygoma of cingulum without dorsal processes but expanded laterally at bases of apodemes; basal valves of penis expanded laterally but not recurved.

General colouration from uniformly brown through brown and ochraceous or green to uniformly green; dorsum of pronotum normally unicolourous but sometimes with median longitudinal contrasting stripe which may continue forwards along vertex; tegmen with pale basal transverse fascia which extends either as far across as medial vein or as far as 1st vannal vein in which case it narrows strongly posteriorly, median pale transverse fascia always extending broadly or narrowly to 1st vannal vein; hind wing hyaline, often bluish basally, apex darkened; hind femur apically with inner area black and upper outer area blackish, lower inner area reddish; hind tibia narrowly black basally, basal quarter ochraceous or pinkish, apical three quarters red, the two colours separated by a narrow and incomplete black band.

♀. As male but larger and more robust; spermatheca as in Text-fig. 50.

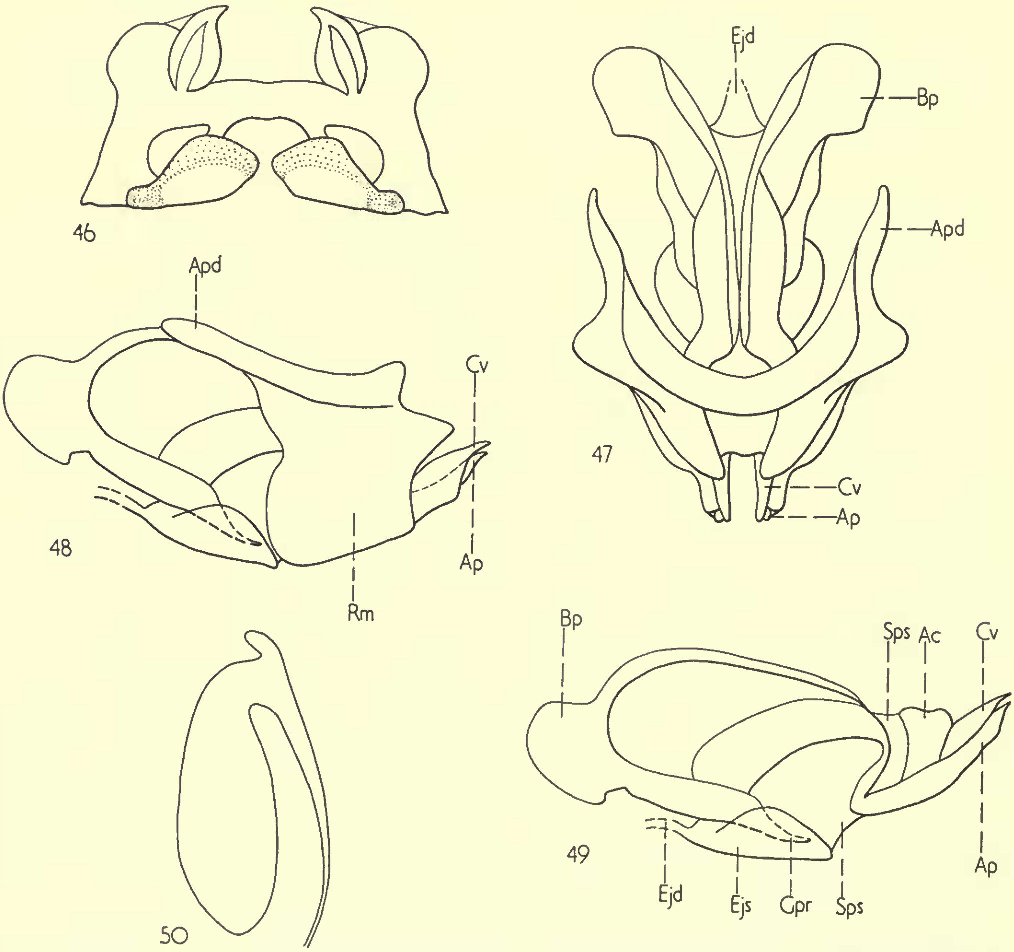
Measurements (mm.). Length of body, ♂ 17·7–23·7, ♀ 22·7–32·0. Length of pronotum, ♂ 3·9–5·0, ♀ 4·6–7·0. Length of tegmen, ♂ 16·7–23·6, ♀ 19·6–30·9. Length of hind femur, ♂ 11·3–14·8, ♀ 13·4–19·2. Maximum width of hind femur, ♂ 3·3–4·1, ♀ 4·3–5·8. Maximum width of head, ♂ 3·3–4·1, ♀ 4·2–5·7.

Ratios (twenty males and twenty females measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·18	1·24	1·29	3·19	3·39	3·64	4·06	4·33	4·85	1·39	1·52	1·71
♀	1·04	1·24	1·33	3·00	3·14	3·45	3·60	3·93	4·51	1·38	1·51	1·67

Discussion. There is considerable variation in size and general colouration in this species. Specimens from N. Africa are much larger than others and their general colouration is very like that of *A. simulatrix*; they can, if not examined in detail, be misidentified as the latter.

A. strepens differs from other species in the genus in the form of the pronotum; also it differs from the *thalassinus* group in having a broad hind femur and from the



FIGS. 46–50. *A. strepens* (Latr.), genitalia. 46, ♂ epiphallus; 47, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 48, same, lateral view; 49, ♂ endophallus, lateral view; 50, ♀ spermatheca.

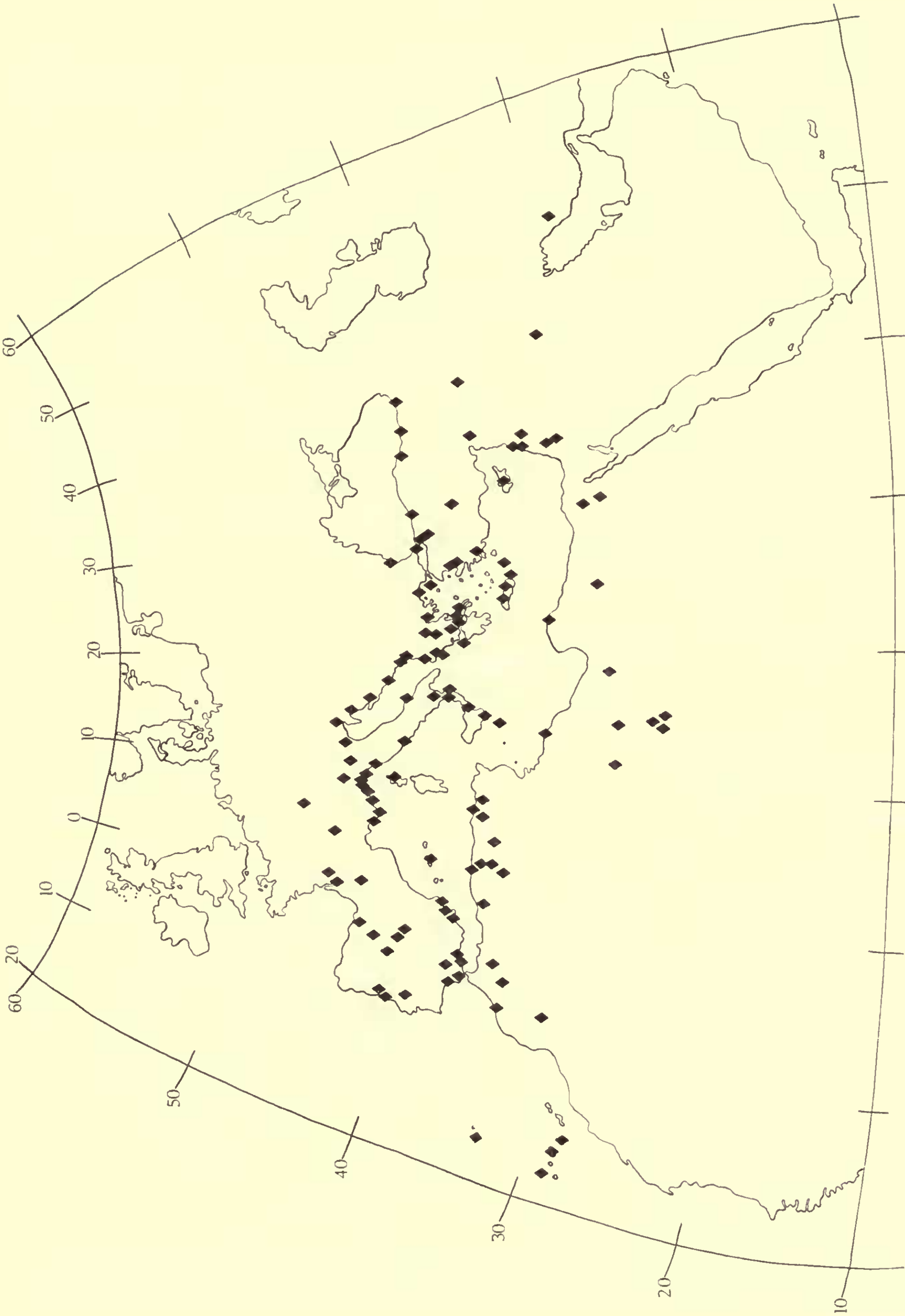


FIG. 51. *A. strepens* (Latr.), distribution map.

simulatrix group in that although the hind femur is broad the hind tibia is as long as the hind femur and has ten outer and eleven inner spines.

The author has examined the type ♂ of *Gryllus prasinus* Thunberg, deposited in Uppsala, and makes the above synonymy although this species has been previously considered a junior synonym (Stål, 1873 : 112) of *A. thalassinus*.

The type of *Acridium vittatum* Brullé has not been traced, but from the original description and figure it is obvious that Finot's synonymy should be accepted.

Distribution (Text-fig. 51). Nine hundred and eighty-four specimens of this species were examined and the following conclusions on its distribution are made:

FRANCE, May to October, December; CORSICA, August; SPAIN, April to May, August to October; BALEARIC Is., April, September to October; PORTUGAL, August; ITALY, July through to May; SICILY, September; SARDINIA, September; MALTA, January; GREECE, April to September; YUGOSLAVIA; July to September; ALBANIA, August; BULGARIA, August; CYPRUS, April to December; TURKEY, July to September, November; LEBANON, March to May, July, September, December; SYRIA, February to May, November; ISRAEL, April; IRAQ, June; IRAN, March; MADEIRA, June to July, November to December; CANARY Is., April, July to September, December, January; MOROCCO, June to September, December, ALGERIA, May to July, September to October; TUNISIA, January, April; LIBYA, February to May, July, September, November; UNITED ARAB REPUBLIC, March, May to August, October.

Aiolopus oxianus Uvarov, 1926

(Text-figs. 10, 25, 52–56)

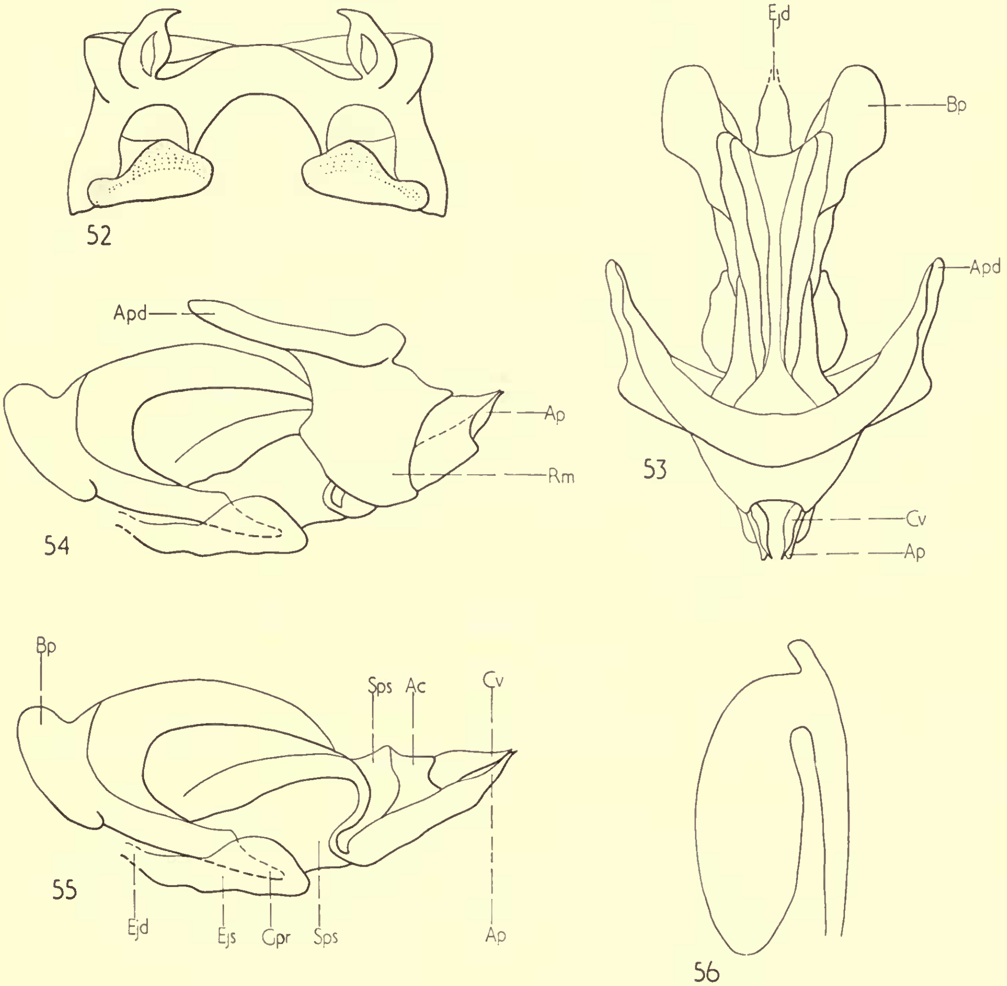
Aiolopus oxianus Uvarov, 1926: 347.

Type locality. USSR, " Kerki, on River Amu-Darya "; type ♂ deposited in Leningrad.

Redescription. ♂. Slender build, moderately rugulose. Antenna longer than combined lengths of head and pronotum, with twenty-two to twenty-four segments, the median segments of the flagellum elongate. Fastigium of vertex pentagonal, longer than wide, weakly concave with well defined margins; fastigial foveolae elongate, trapezoid, narrowing forwards, more than twice as long as maximum width, with well defined margins; frontal ridge weakly sulcate along most of length (Text-fig. 25), marginal carinulae low but distinct almost to clypeus, parallel along most of their length but converging slightly just below fastigium. Eye more rounded than in other species, little more than one and a quarter times higher than maximum width but twice as high as length of subocular groove. Pronotum narrow, weakly saddle-shaped, prozona constricted medially; metazona about one and three quarter times longer than prozona, with obtuseangular posterior margin; lateral plate of pronotum higher than wide; mesosternal interspace slightly wider than long. Tegmen long and narrow, well exceeding tip of hind femur. Hind femur narrow, ratio of length to maximum width about 4·1; hind tibia as long as hind femur, with ten outer and eleven inner spines, inner apical spurs slightly longer than outer pair; arolium very small (Text-fig. 10), about one quarter the length of claw. Supra-anal plate, cercus and subgenital plate normal for genus. Phallic complex (Text-figs. 52–55) with apodemes of zygoma of cingulum short, weakly sinuous and with apices weakly expanded dorsally, dorsal processes of zygoma weak or absent; basal valves of penis expanded apically but not recurved, apical penis valves slightly longer than normal.

General colouration brown with some ochraceous and black markings; head and pronotum with narrow median longitudinal ochraceous stripe sometimes present, ochraceous X-shaped pattern on dorsum of pronotum weak or absent; tegmen with broad dark transverse band basally and diffuse dark band medially, apical half mottled; hind wing hyaline; upper outer area of hind femur with three black spots, outer area with faint subapical black transverse band and faint ochraceous apical ring, inner area with three diffuse black spots, lower inner area reddish; hind tibia ochraceous in basal half interrupted by broad black ring one third the way along, apical one third reddish.

♀. As male but larger; eye a little more ellipsoid than male, about one and a half times as high as maximum width and one and a half times as high as length of subocular groove. Spermatheca as in Text-fig. 56.



Figs. 52–56. *A. oxianus* Uv., genitalia. 52, ♂ epiphallus; 53, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 54, same, lateral view; 55, ♂ endophallus, lateral view; 56, ♀ spermatheca.

Measurements (mm.). Length of body, ♂ 18·6–22·0, ♀ 27·6–29·5. Length of pronotum, ♂ 3·7–4·4, ♀ 4·8–5·8. Length of tegmen, ♂ 18·6–21·2, ♀ 24·5–27·1. Length of hind femur, ♂ 11·3–12·7, ♀ 14·2–16·1. Maximum width of hind femur, ♂ 2·7–3·2, ♀ 3·4–3·9. Maximum width of head, ♂ 3·3–3·7, ♀ 4·2–4·8.

Ratios (eight males and twelve females measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·12	1·16	1·21	3·97	4·08	4·18	4·82	4·99	5·21	1·59	1·67	1·73
♀	1·06	1·13	1·23	3·95	4·07	4·30	4·67	4·94	5·27	1·64	1·72	1·79

Discussion. Only a few specimens of this species have been examined and variation has been observed in size and general colouration.

The holotype of *A. oxianus* is deposited in the Leningrad Academy of Sciences and due to institutional policy was not available for study. However, from a study of the description and some paratypes in the BM(NH) it is clear that the name *oxianus* should be applied to the taxon described above.

Superficially *A. oxianus* strongly resembles *Epacromius tergestinus* (Charp.) but the form of the fastigial foveolae, the position of the intercalary vein of the medial area of the tegmen and the form of the male subgenital plate show that the species is more naturally placed in the genus *Aiolopus*. By its slender form and weakly saddle-shaped pronotum *A. oxianus* would appear to be closely related to *A. thalassinus*, from which species it may be distinguished by the elongate fastigial foveolae, longer antennae, completely sulcate frontal ridge and small arolium.

Distribution. (Thirteen males and twenty-two females).

USSR: Kerki, on River Amu-Darya, 4 ♂, 3 ♀, vii; Tchardzhui, on River Amu-Darya, 1 ♂, 2 ♀, viii; Syr Darya, Nadeshdinsky, 2 ♀, vi; Samarkand, R. Zaravshan, 1 ♀, vii; Khiva Town, 7 ♂, 7 ♀, " at light ", vii; Khiva distr., Gudzha, 1 ♂, 3 ♀, vii; Karmysh, 2 ♀, vii; Turkestan, 1 ♀.

Aiolopus carinatus (Bei-Bienko, 1966) **comb. n.**

(Text-figs. 19, 20, 29, 57–60)

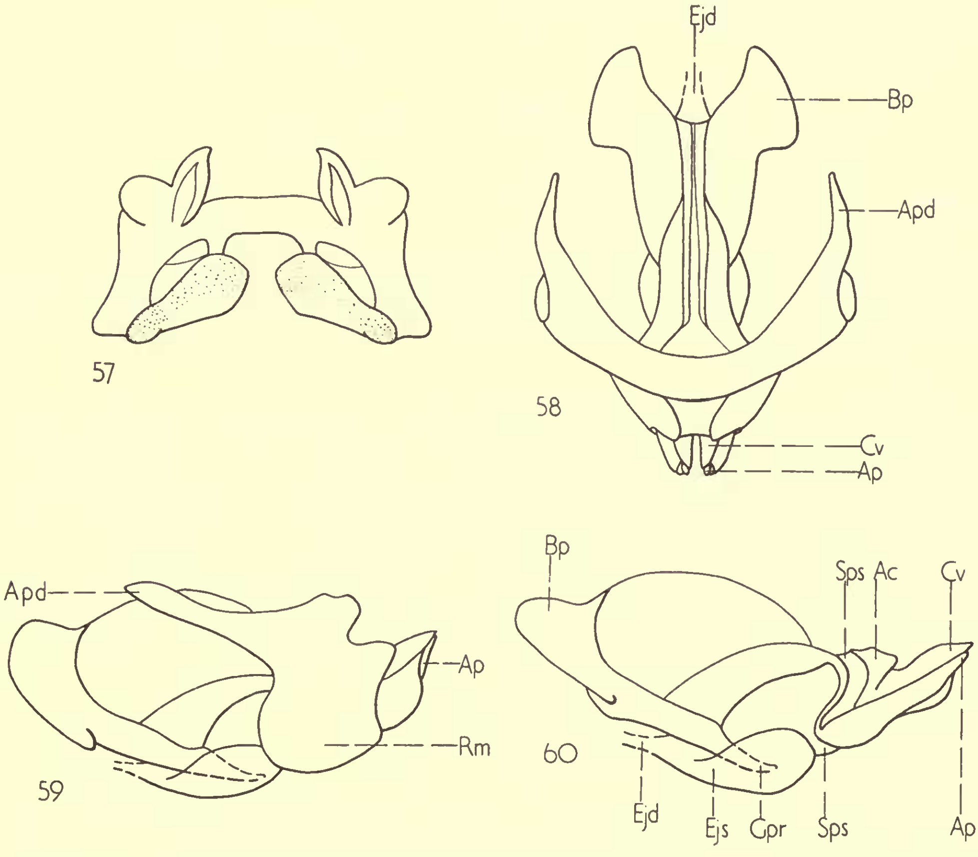
Aeoloptilus carinatus Bei-Bienko, 1966 : 1793, fig. 7.

Type locality. Komodo Islands, mountain plateau, 500–600 m.; type ♀ deposited in Leningrad.

Redescription. ♂. Integument moderately rugulose. Antenna as long as combined lengths of head and pronotum, with twenty-two segments. Fastigium pentagonal, forward angle rounded, weakly concave with margins fairly well developed at least in front of eyes; fastigial foveolae subrectangular with rounded angles, shallow, about one and a half times as long as maximum width; frontal ridge flat or weakly convex, very slightly narrowing upwards (Text-fig. 29). Eye ellipsoid, about one and half times as high as maximum width and almost two and a half times as high as length of subocular groove. Pronotum with dorsum weakly saddle-shaped (Text-figs. 19–20), prozona about three quarters the length of the metazona, latter with obtuse-angular posterior margin; lateral carinae moderately developed in prozona, parallel or very weakly divergent in front of first transverse sulcus and weakly divergent back to posterior transverse sulcus, almost obliterated in metazona; lateral plate of pronotum slightly higher than wide; mesosternal interspace slightly wider than long. Tegmen long, well exceeding apex of hind femur. Hind femur narrow, about four times as long as maximum width; hind tibia almost as long as hind femur, with twelve outer and twelve or thirteen inner spines, apical spurs simple with outer pair about one and a half times as long as inner pair; arolium half length of claw. Supra-anal plate, cercus and subgenital plate normal for genus. Phallic complex (Text-figs. 57–60) with zygoma of cingulum without dorsal processes and apodemes laterally flattened; basal valves of penis with large lateral expansions which are not recurved.

General colouration brown with dark brown and ochraceous markings. Lateral carinae of pronotum pale brown or ochraceous; tegmen with costal stripe ochraceous and complete, proximal half of tegmen with dark brown area extending from costa to cubital vein, vannal area hyaline, distal half of tegmen mottled hyaline and brown; hind femur brown with pregenicular ochraceous ring, upper outer area with two weak triangular brown spots, inner area ochraceous with two incomplete dark bands, lower inner area with weak orange tinge; hind tibia narrowly black basally, followed by broad ochraceous ring, apical two thirds greyish blue, sometimes apical quarter has weak orange tinge; hind wing hyaline with darker distal area.

♀. As male but slightly larger and more robust; ovipositor normal for genus.



Figs. 57–60. *A. carinatus* (Bei-Bienko), male genitalia. 57, epiphallus; 58, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 59, same, lateral view 60, endophallus, lateral view.

Measurements (mm.). Length of body, ♂ 16·8, ♀ 20·6–21·4. Length of pronotum, ♂ 3·0, ♀, 3·6–3·8. Length of tegmen, ♂ 14·8, ♀ 16·5–17·5. Length of hind femur, ♂ 10·0, ♀ 11·4–11·9. Maximum width of hind femur, ♂ 2·3, ♀ 2·5–2·8. Maximum width of head, ♂ 2·7, ♀ 3·2–3·3.

Ratios (one male and two females measured):

	P/C		FL/FW		E/P		E/F	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
♂	1·11		4·35		4·93		1·48	
♀	1·12	1·15	4·25	4·56	4·58	4·60	1·45	1·47

Discussion. When originally described this species was thought to be generically distinct from *Aiolopus*, but for reasons explained above (p. 315) this generic separation is not accepted by the present author.

A. carinatus appears to be very closely allied to *A. th. tamulus*, from which it may be distinguished by the form of the fastigial foveolae, the pronotal carinae and the greater number of spines on the hind tibia.

Distribution. Komodo Is.: Rintja, 1 ♂, 1 ♀, viii (Leningrad). Sumba Is.: Melolo, 1 ♀, v (Willemse).

Aiolopus longicornis Sjöstedt, 1909.

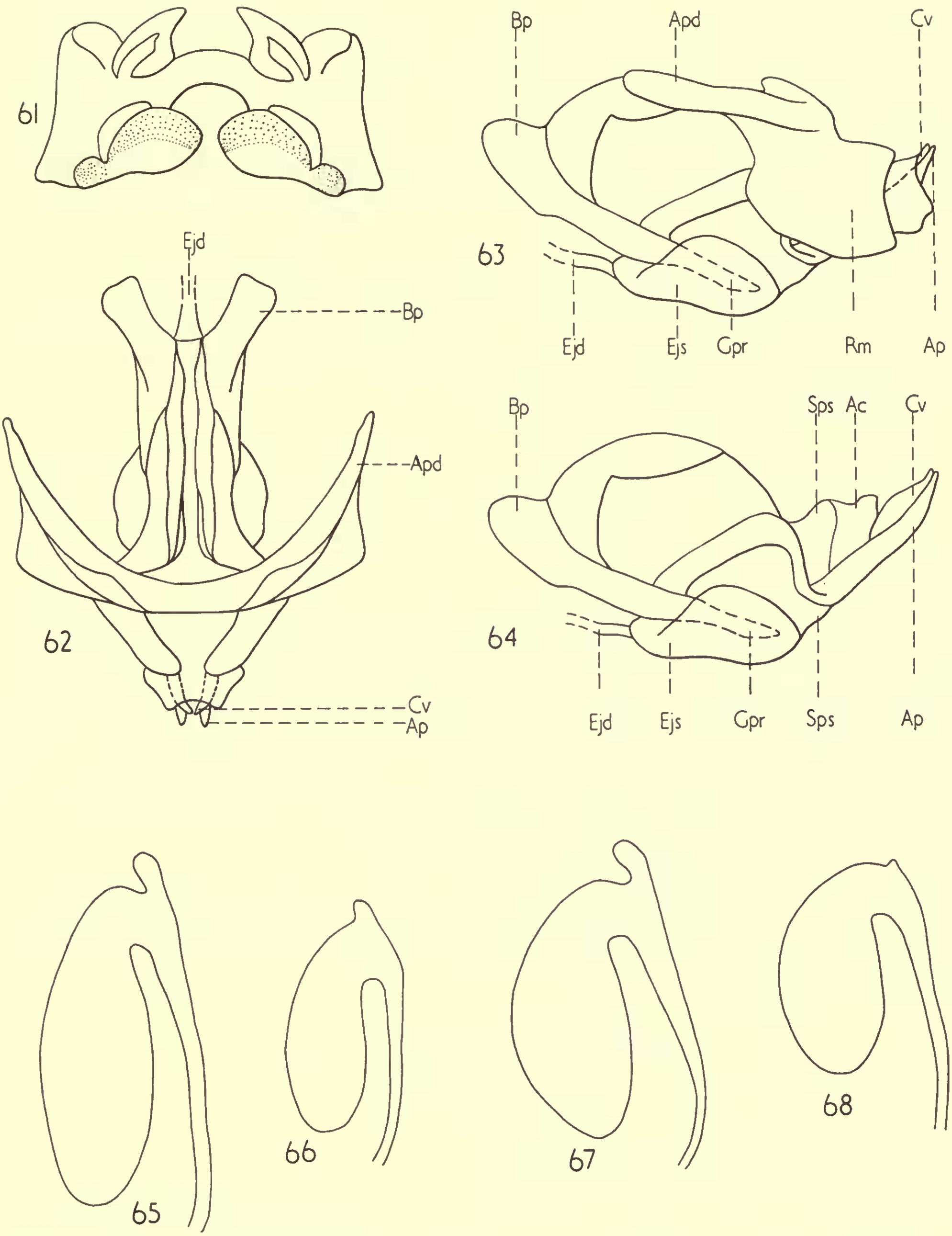
(Text-figs. 6, 17, 18, 26, 61–69)

Aiolopus longicornis Sjöstedt, 1909 : 156, 169.

Type locality. This species was described from two males and two females from Zanzibar and one female from Mombo, Usambara; one male specimen from Zanzibar bears Sjöstedt's type label, and this specimen is selected as LECTOTYPE and is deposited in Stockholm.

Redescription. ♂. Larger than average size for genus. Integument more strongly rugulose. Antenna clearly longer than combined lengths of head and pronotum, with twenty-two to twenty-four segments, the median segments elongate and about three times longer than broad. Fastigium broadly pentagonal, little longer than wide, moderately concave, strongly sloping forwards and roundly merging with frons, marginal carinulae well developed; fastigial foveolae almost rectangular, hardly narrowing forwards, weakly concave with moderately developed margins, the lower one often weak; frons oblique; frontal ridge coarsely and densely pitted, flat but impressed at median ocellus, merging with genae well before clypeus, lateral margins weakly convergent at apex (Text-fig. 26). Eyes oval, slightly less than one and a half times as high as maximum width and about twice the length of the subocular groove. Pronotum (Text-figs. 17–18) short and wide, hardly more than one and one third times longer than maximum width, moderately saddle-shaped, with prozona constricted medially; metazona with obtuse-angular posterior margin; lateral plate of pronotum higher than wide; mesosternal interspace slightly wider than long, weakly trapezoid, widening posteriorly. Tegmen relatively long (see E/P and E/F ratios). Hind femur (Text-fig. 6) moderately broad, FL/FW ratio about 3·7; hind tibia almost as long as hind femur, with nine outer and ten inner spines, inner apical spurs almost twice as long as outer spurs; arolium about half length of claw. Phallic complex (Text-figs. 61–64) with zygoma of cingulum with well developed dorsal processes and short apodemes; basal valves of penis hardly expanded laterally.

General colouration brown with ochraceous (or rarely green) and blackish markings; median longitudinal ochraceous stripe on head and pronotum normally well defined, ochraceous X-shaped



FIGS. 61–68. *A. longicornis* Sjöst., genitalia. 61, ♂ epiphallus; 62, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 63, same, lateral view; 64, ♂ endophallus, lateral view; 65, ♀ spermatheca of specimen from Chad area; 66, same, from Congo; 67, same, from Rukwa, Tanzania; 68, same, from Tingida, Tanzania.

pattern on dorsum of pronotum clearly defined; tegmen with two V-shaped ochraceous areas extending from anterior border to mid-line, apical half mottled, first and second vannal areas often ochraceous and when tegmen are folded this colouration forms a continuous stripe with that of head and pronotum; hind wing hyaline, sometimes with faintly yellowish base and sometimes with darkened apex and posterior border; hind femur with three weak black spots on upper outer area, external area mottled ochraceous black with the black colour often weak, ochraceous pregenicular ring distinct, apex black; inner area with complete preapical black band and medial black spot in dorsal half, lower inner area reddish; hind tibia with narrow basal black ring followed by broad ochraceous ring and then a broad black ring, ochraceous medially and apical third reddish.

♀. Larger and more robust than male. Spermatheca as in Text-figs. 65–68, with apical diverticulum varying from a small bubble-like projection to a finger-like tube.

Measurements (mm.). Length of body, ♂ 18·8–26·5, ♀ 25·3–31·7. Length of pronotum, ♂ 3·7–5·0, ♀ 4·4–5·5. Length of tegmen, ♂ 18·6–24·5, ♀ 23·7–27·8. Length of hind femur, ♂ 11·1–16·0, ♀ 14·8–17·6. Maximum width of hind femur, ♂ 3·3–4·3, ♀ 4·0–4·8. Maximum width of head, ♂ 3·6–5·0, ♀ 4·2–5·8.

Ratios (fifty males and twenty females measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	0·93	1·05	1·16	3·55	3·70	3·97	4·74	5·03	5·50	1·47	1·58	1·67
♀	0·92	1·04	1·09	3·53	3·68	3·84	4·87	5·14	5·48	1·56	1·61	1·66

Discussion. This species is intermediate between the *thalassinus* group and the *simulatrix* group, having the relatively longer hind femur and tibia and the saddle-shaped pronotum of the former and the stouter build and more strongly rugulose integument of the latter. *A. meruensis* is possibly its closest relative, also having a relatively broad head and short pronotum, but *longicornis* may be distinguished from *meruensis* by the broad frontal ridge, the elongate median segments of the antennal flagellum, the relatively longer tegmen and the narrower hind femur.

Distribution (Text-fig. 69). Two hundred and eighty-one specimens of this species were examined, indicating the following distribution:

NIGERIA (Chad area), February; CONGO, (former Belgian), August; ETHIOPIA, September, December; SOMALIA, August, October; KENYA, January, March, May, October; UGANDA, April to July; TANZANIA, throughout the year; BURUNDI, April; ZAMBIA, March, August.

Aiolopus meruensis Sjöstedt, 1909

(Text-figs. 69–74)

Aiolopus meruensis Sjöstedt, 1909 : 156, 170.
Aeolopus latus Uvarov, 1922 : 545, **syn. n.**

Type locality. Meru (Tanzania): Flodhästsjöarne; type ♀ deposited in Stockholm.

Redescription.—♂. Integument moderately rugulose. Antenna at most as long as combined lengths of head and pronotum, with twenty-one to twenty-three segments. Fastigium of vertex rounded pentagonal, about as long as wide, weakly concave, with well defined margins; fastigial foveolae trapezoid, broad, barely one and a half times longer than wide, narrowing forwards, margins well defined but sometimes lower margin weak; frontal ridge flat or weakly sulcate at and below median ocellus, lateral margins gradually and continuously convergent upwards, moderately coarsely pitted. Eyes one and a half times as high as maximum width and almost twice as long as subocular groove. Pronotum slightly saddle-shaped, broad; metazona about one and two thirds the length of prozona, with obtuseangular or almost rounded posterior margin; lateral plate of pronotum slightly higher than wide; mesosternal interspace wider than long, trapezoid, widening posteriorly. Tegmen relatively short, E/F ratio about 1·47. Hind femur broad, ratio of length to width about 3·39; hind tibia almost as long as hind femur, with nine to ten outer and ten to eleven inner spines, inner apical spurs about twice as long as outer spurs;

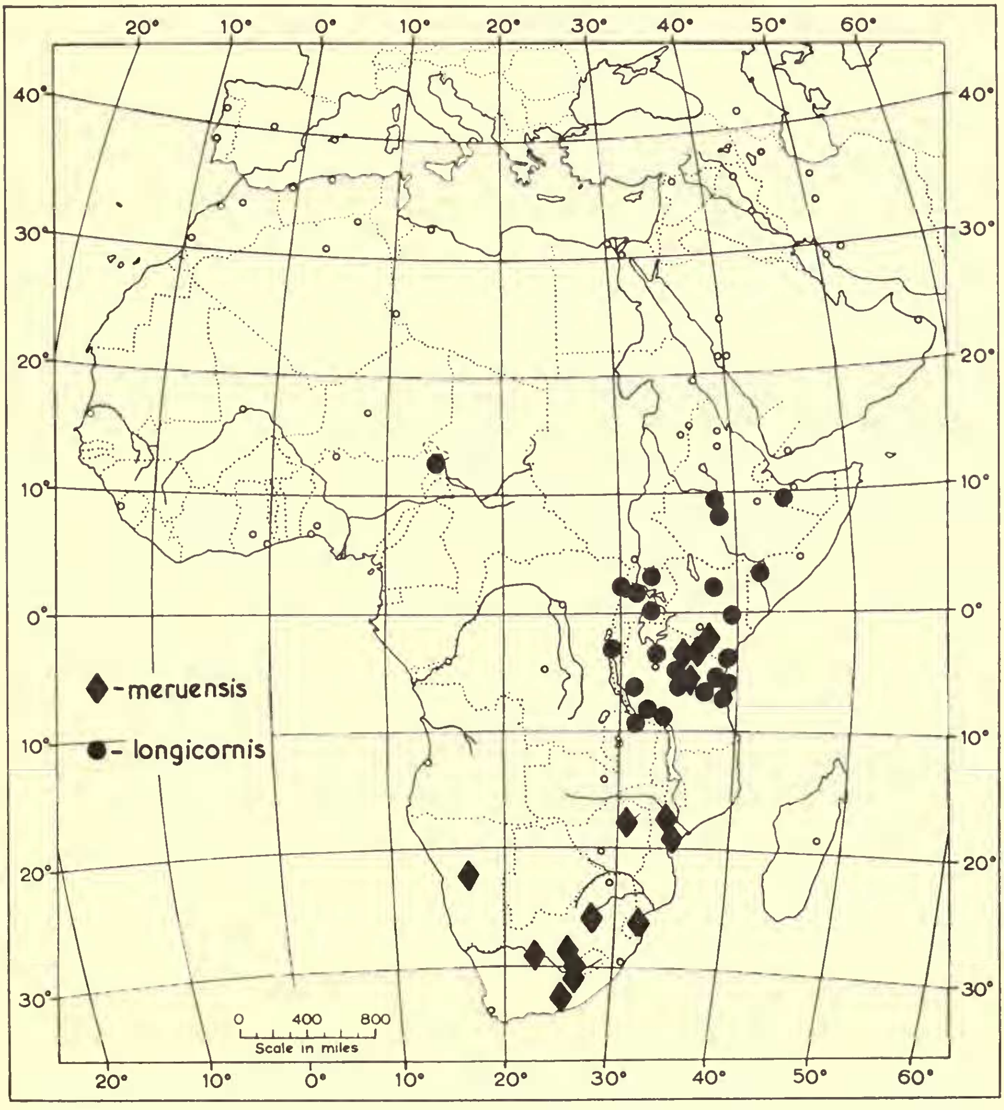
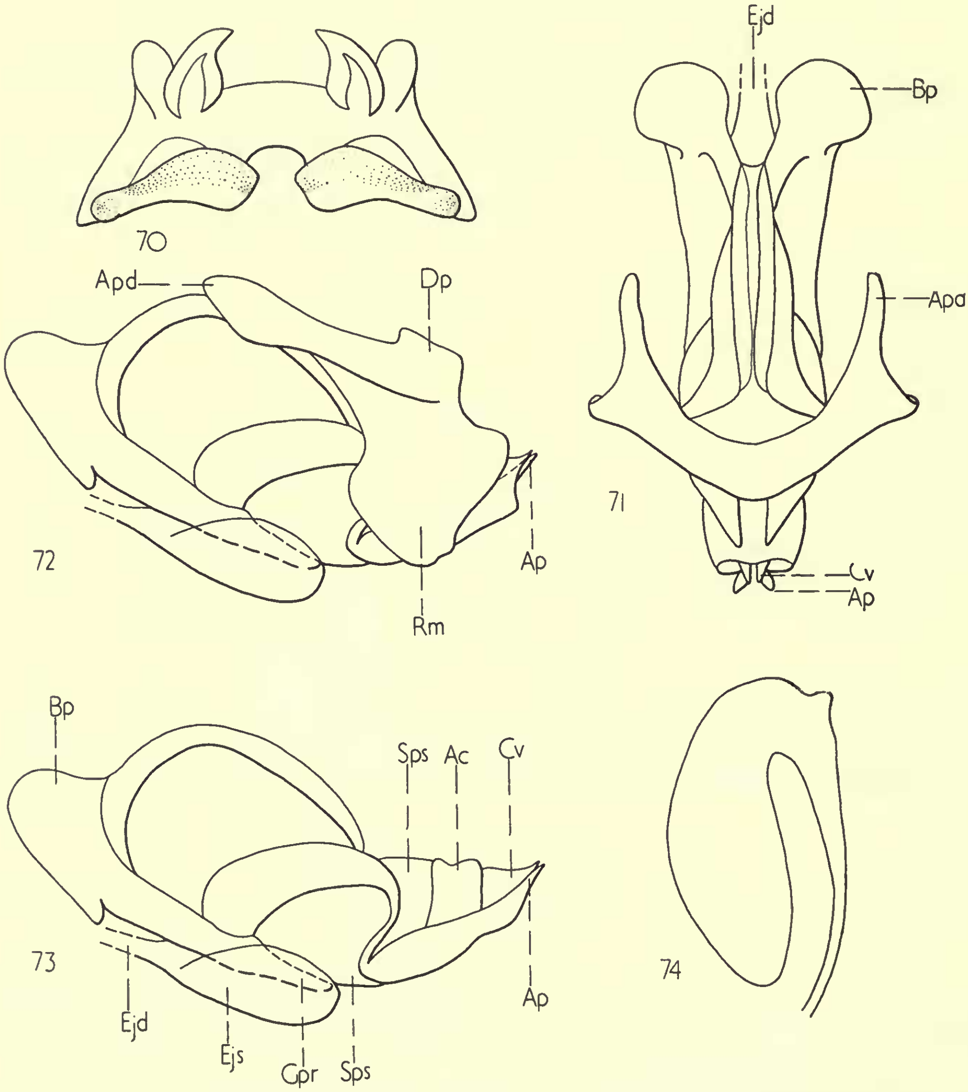


Fig. 69. *Aiolopus* spp., distribution map.

arolium half length of claw. Supra-anal plate, cercus and subgenital plate normal for genus, Phallic complex (Text-figs. 70–73) with zygoma of cingulum with well developed dorsal processes and lateral expansions at bases of apodemes, latter short; basal valves of penis with rounded lateral expansions.

General colouration brown with ochraceous or greenish markings; head and pronotum with median longitudinal pale stripe, pronotum with obvious X-shaped ochraceous pattern; tegmen with pale stripe in first vannal area and two transverse pale bands, apical third mottled; hind wing hyaline, often weakly pale yellow basally and with infumate apex; hind femur on outer side



FIGS. 70–74. *A. mervensis* Sjöst., genitolia. 70, ♂epiphallus; 71, ♂phallic complex, dorsal view, epiphallus; and ectophallic membrane removed; 72, same, lateral view; 73, ♂ endophallus, lateral view; 74, ♀ spermatheca.

with weak and diffuse basal, medial and apical obliquely transverse bands, on inner surface with two incomplete dark bands, lower inner area reddish; hind tibia ochraceous in basal third, then with incomplete blackish ring, apical one third to two thirds reddish.

♀. As male but larger and more robust. Eyes slightly less than one and a half times higher than wide and less than twice as high as length of subocular groove; spermatheca as in Text-fig. 74.

Measurements (mm.). Length of body, ♂ 16·0–21·2, ♀ 21·2–29·7. Length of pronotum, ♂ 3·2–4·1, ♀ 3·7–5·4. Length of tegmen, ♂ 14·3–19·8, ♀ 14·5–23·1. Length of hind femur, ♂ 9·5–12·8, ♀ 11·2–15·9. Maximum width of hind femur, ♂ 2·6–3·8, ♀ 3·2–4·8. Maximum width of head, ♂ 2·9–4·0, ♀ 3·7–5·1.

Ratios (fourteen males and twenty-nine females measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·02	1·09	1·17	3·18	3·39	3·66	3·76	4·42	4·89	1·28	1·47	1·64
♀	0·94	1·04	1·15	3·08	3·37	3·68	3·45	4·35	5·07	1·29	1·47	1·66

Discussion. In having a short, broad, slightly saddle-shaped pronotum, a broad hind femur and a hind tibia almost as long as the hind femur, *A. meruensis* is probably more closely related to *A. longicornis* Sjöstedt than to any other species in the genus; it is differentiated from *longicornis* by the narrower frontal ridge, the much shorter antennae, the shorter tegmen and the broader hind femur.

A. meruensis is variable over its range of distribution but the variations do not follow any particular geographical pattern. The form of the frontal ridge may vary from flat to weakly sulcate. The posterior margin of the pronotum varies from obtuseangular to almost rounded. The relative length of the tegmen is extremely varied; normally the tegmen extends to just beyond the tip of the hind femur but in the single specimen examined from Kilimanjaro it barely reaches the apex of the abdomen, in the specimens examined from Bloemfontein it just reaches the apex of the hind femur and in those from Lake Manyara, Tanzania, it extends well beyond the apex of the hind femur.

The original description of this species was not very diagnostic and caused it to be previously confused with *A. thalassinus thalassinus*. Uvarov's type ♀ of *A. latus* described from Bloemfontein and deposited in the BM(NH), when considered together with the other material of *meruensis* shows no significant difference and is therefore synonymized with *meruensis*.

Distribution (Text-fig. 69). The forty-five specimens examined were collected in the following countries:

KENYA, August; TANZANIA, January, April; RHODESIA, April; MOZAMBIQUE, February, May, July; SOUTH AFRICA, January, April, June, September, November; S.W. AFRICA, March.

Aiolopus thalassinus (Fabricius, 1781)

This species is divided into four subspecies which are described and discussed below.

Aiolopus thalassinus thalassinus (Fabricius, 1781) stat n.

(Text-figs. 1–5, 11, 12, 21, 75–84, 90, 91)

Gryllus thalassinus Fabricius, 1781 : 367.
Acridium grossum Costa, 1836 : 25, pl. 3, fig. 4, a–d; Fischer, L. H., 1853 : 361.
Acridium laetum Brullé, 1840 : 77, pl. 5, figs. 10–10a; Finot, 1895 : 423.
Epacromia angustifemur Ghiliani, 1869 : 179; Kirby, 1910 : 191.
Ochrophlebia (?) *savignyi* Krauss, 1890 : 261 (Savigny, Desc. Egypt, pl. 6, fig. 15 (3)); Storey, 1919 : 54.
Epacromia lurida Brancsik, 1895 : 250, **syn. n.**
Aiolopus thalassinus kivuensis Sjöstedt, 1923 : 18; Sjöstedt, 1929 : 24.
Aiolopus acutus Uvarov, 1953 : 111, figs. 129–131, **syn. n.**

Type locality. The type was in Allioni's collection in Turin but has been destroyed by fire. NEOTYPE (♀) erected bearing the following data: SWITZERLAND: Locarno, Maggia Delta, 16.ix.1929 (*Zeuner*); it is deposited in the BM(NH).

Redescription. ♂. Moderately rugulose. Antenna as long as combined lengths of head and pronotum, with twenty-two to twenty-four segments. Fastigium pentagonal, forward angle rounded, or subangular in specimens from Ethiopian and Oriental regions, moderately concave with well defined margins; fastigial foveolae trapezoid, normally slightly narrowing forward, about twice as long as maximum width; frontal ridge flat or slightly convex, sparsely pitted, lateral margins parallel except at apex where they converge slightly (Text-fig. 21). Eye oval, about one and a half times as high as maximum width and almost twice as high as length of subocular groove. Pronotum slightly saddle-shaped; metazona almost one and two thirds as long as prozona; latter constricted medially and with weak lateral "shoulders"; posterior margin of metazona obtuseangular (Text-figs. 11–12); lateral plate of pronotum slightly higher than wide; mesosternal interspace almost square. Tegmen long, well exceeding tip of hind femur. Hind femur narrow, about four times as long as maximum width (for range see ratios below); hind tibia as long as or only very slightly shorter than hind femur (Text-fig. 5), with ten outer and eleven inner spines, inner apical spurs about one and half times as long as outer spurs; arolium half length of claw. Supra-anal plate, cercus and subgenital plate normal.

Phallic complex (Text-figs. 75–78) with epiphallus having moderately developed outer lophal lobe; zygoma of cingulum with longer apodemes and poorly developed dorsal processes; basal valves of penis with lateral expansions strongly developed and recurved.

General colouration green or brown with ochraceous and black markings. Pronotum with or without median longitudinal ochraceous stripe and with or without ochraceous criss-cross pattern on dorsum, if without then dorsum unicolorously green or ochraceous and with blackish bordering colouration below "shoulders"; costal area of tegmen with interrupted ochraceous stripe, generally mottled and without clearly defined transverse bands; hind wing hyaline, sometimes weakly yellowish green basally and often with darkened apex; hind femur on upper outer area with two triangular black spots which continue onto outer area as incomplete oblique fasciae and on inner area as complete fasciae, apex of hind femur blackish with preceding complete or incomplete ochraceous ring; hind tibia narrowly black basally, followed by broader ochraceous ring, apical two thirds normally reddish, the red colouration separated from ochraceous ring by greyish ring.

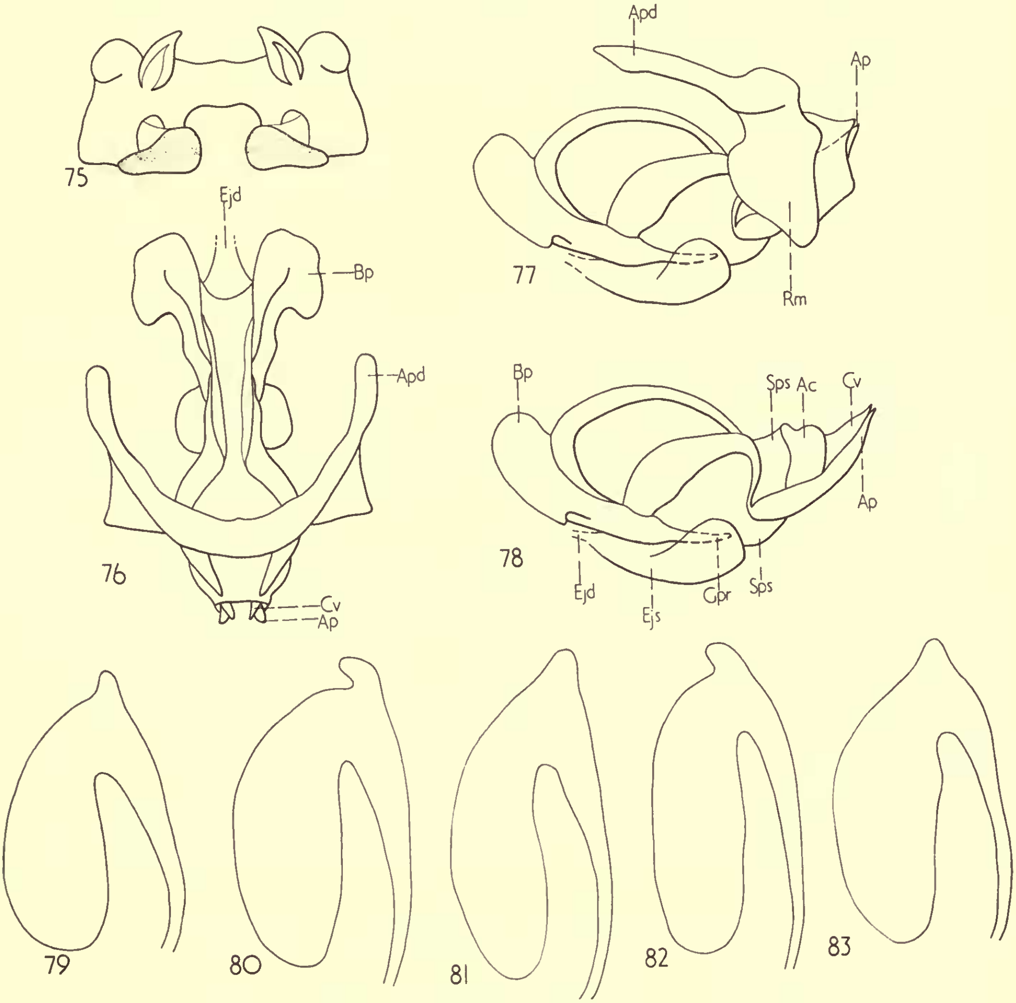
♀. As ♂ but larger and more robust; frontal ridge often more convex; spermatheca (Text-figs 79–83) variable, with pre-apical diverticulum of varying lengths; ovipositor as in Text-figs. 2–3.

Measurements (mm.). Length of body, ♂ 15·2–21·2, ♀ 19·8–29·3. Length of pronotum, ♂ 2·8–4·0, ♀ 3·8–5·5. Length of tegmen, ♂ 14·2–20·5, ♀ 17·0–26·3. Length of hind femur, ♂ 9·5–12·2, ♀ 10·9–16·5. Maximum width of hind femur, ♂ 2·3–3·0, ♀ 2·7–3·8. Maximum width of head, ♂ 2·6–3·4, ♀ 3·1–4·5.

Ratios (forty specimens of each sex measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·04	1·18	1·27	3·81	4·06	4·33	4·57	4·99	5·44	1·42	1·62	1·81
♀	1·10	1·20	1·37	3·80	4·10	4·50	4·25	4·86	5·22	1·52	1·67	1·83

Discussion. *A. th. thalassinus* is widely distributed in the southern palaearctic, ethiopian and western oriental regions (see Text-fig. 84), and consequently shows great variability. Its general colouration varies from almost completely green,



FIGS. 75–83. *A. thalassinus thalassinus* (Fabr.), genitalia. 75, ♂ epiphallus; 76, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 77, same, lateral view; 78, ♂ endophallus, lateral view; 79, ♀ spermatheca of specimen from France; 80, same, of specimen from Morocco; 81, same, of specimen from Kenya; 82, same, of specimen from South Africa; 83, same, of specimen from India.

through green with brown markings, to brown with ochraceous and black markings. The pronotum always has a contrasting pattern dorsally and laterally suggesting the presence of lateral carinae. The hind tibia sometimes lacks its reddish colouration, cream or grey being the replacement colour. The anterior angle of the fastigium varies from rounded to quite sharp, specimens with the latter character having been described as a distinct species, *A. acutus* Uvarov (1953). However, as all intermediate forms of fastigium can be found and there is no geographical evidence to support this separation, Uvarov's species is synonymized. The frontal ridge varies from slightly convex to flat with a depression at the median ocellus.

A small series from Angola, collected from a mangrove swamp 4 mls. S.E. of Luanda, which was studied shows rather greater than average variation in the length of the pronotum and tegmen and the width of the hind femur.

Ratios of measurements of Angola specimens:

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·03	1·06	1·09	3·81	3·86	3·92	4·28	4·49	4·87	1·40	1·46	1·49
♀	1·00	1·04	1·08	3·90	3·97	4·05	4·34	4·39	4·43	1·40	1·43	1·47

As only six males and three females were examined and other specimens from other parts of Angola appear quite normal, no taxonomic significance is attached to this series at present.

In previous publications the lists of synonymy for this subspecies are at variance with the list given in the present paper; the latter is arrived at as follows:

Gryllus prasinus Thunberg is removed from the synonymy of this subspecies and synonymized with *A. strepens* (Latreille).

The type of *Oedipoda pulverulenta* Fischer de Waldheim, 1846 is deposited in Leningrad and because of institutional policy was not available for study. Professor G. Ya Bei-Bienko has examined the specimen and reports that it does not belong to the genus *Aiolopus*, as thought by Fischer, L. H. (1853 : 36), and is to be referred to the genus *Epacromius*.

The type of *Acridium grossum* Costa is destroyed and Fischer's synonymy is accepted. Similarly the type of *Acridium laetum* Brullé is destroyed and Finot's synonymy is accepted.

The type of *Epacromia angustifemur* Ghiliani, which is deposited in Turin, is also unavailable for study, but from the original description it is clear that Kirby's synonymy is correct.

Ochrophlebia (?) *savignyi* Krauss was described from a drawing by Savigny (1809–13 : pl. 6, fig. 15 (3)) and after examination of Savigny's figure Storey's synonymy is accepted.

The type of *Epacromia lurida* Brancsik was deposited in Budapest but has been destroyed. However, Uvarov (1953 : 109) states that he examined the type and found it " appears to be a species of the *thalassinus* group ". The type locality is " Boroma, Zambesi ", and after examination of material from areas close to the type locality the present author synonymizes this name with *A. thalassinus*.

A. th. kivuensis Sjöstedt was described from a single female specimen from Lake Kivu, in the former Belgian Congo, and is deposited in Stockholm. An examination of Sjöstedt's type has shown that its present synonymy is correct.

A. acutus Uvarov was described from a series of specimens from Katanga, in the former Belgian Congo, and the type ♂ is deposited in the BM(NH). It is synonymized for the reasons stated above.

Distribution (Text-fig. 84). From the four thousand specimens examined the following general conclusions are drawn:

FRANCE, June to November; SPAIN, April, September, October; BALAERIC IS., September, October; PORTUGAL, August; SWITZERLAND, September; ITALY, September to November; SARDINIA, September; AUSTRIA, August; CZECHOSLOVAKIA, August; HUNGARY, March, July, October; YUGOSLAVIA, May to June, August to September; ALBANIA, June, August to September; GREECE, May to August; CYPRUS, May, August, October; TURKEY, June to September; USSR, June to September; KASHMIR, May to October; NEPAL, July, September to October; INDIA, February to December; WEST PAKISTAN, May through to January; AFGHANISTAN, April; PERSIA, March to December; IRAQ, May to July, September to December, February; SYRIA, April to August; LEBANON, March, May to June; ISRAEL, May to June August, October, January; JORDAN, March to April, June; SAUDI ARABIA, All year round; YEMEN, June, August to September, December through to April; SOUTHERN YEMEN, May through to March; MUSCAT AND OMAN, August to September, January to May; BAHREIN, May; SOCOTRA, August, January to April; EGYPT, May to November, January to February; LIBYA, September, February to July; TUNISIA, March to April; ALGERIA, October, March to July; MOROCCO, June to July, November; MADEIRA, July to August, November to December; CANARY IS., July through to May; CAPE VERDE IS., No dates; MALI, May through to January; SENEGAL, August to September; GAMBIA, April; GUINEA, No dates; SIERRA LEONE, No dates; GHANA, All year round; TOGO, February, May; NIGERIA, May to October, December through to March; SUDAN, May to August, November to December, February; ETHIOPIA, May through to March; SOMALIA, June, August through to March; KENYA, January to November; UGANDA, May through to March; RUANDA, August; CONGO, May to October, December, February; ANGOLA, March to November; ZAMBIA, October through to August; TANZANIA, All year round; MALAWI, June, December; MOZAMBIQUE, June to August, October to November, February, April; COMORO IS., September to October; S. W. AFRICA, June, October, December; BOTSWANA, May, October; RHODESIA, October through to August; SOUTH AFRICA, August through to June.

Aiolopus thalassinus rodericensis (Butler, 1876) **stat. n.**

(Text-figs. 84–91)

Epacromia rodericensis Butler, 1876 : 410.
Epacromia famulus [*sic*] var. *pusilla* I. Bolivar, 1895 : 378; I. Bolivar, 1912 : 270.
Chortoicetes rodericensis (Butler, 1876) Kirby, 1910 : 193.
Aeolopus aldabrensis I. Bolivar, 1912 : 269; Dirsh, 1963 : 264.

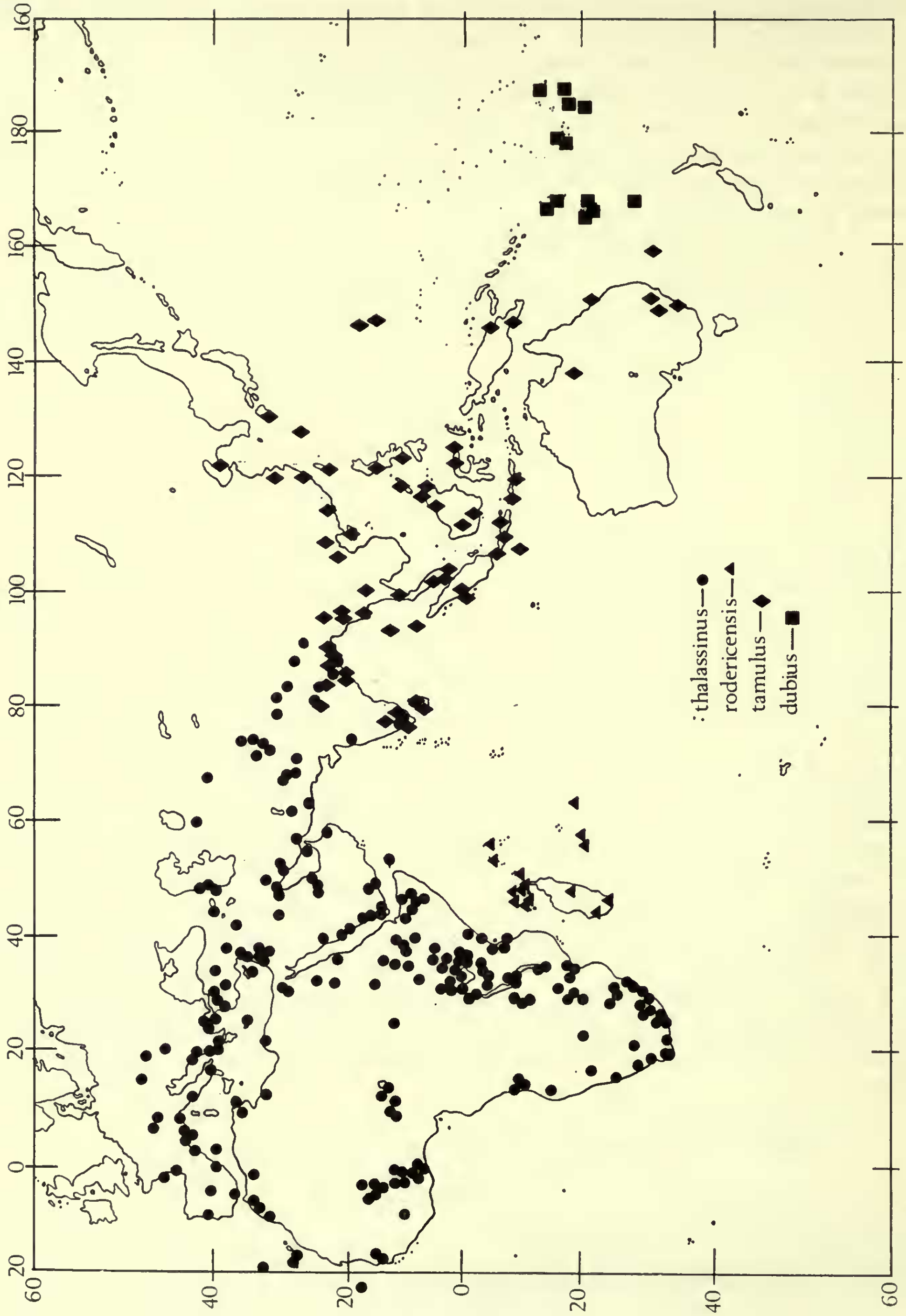


FIG. 84. *A. thalassinus* subspp., distribution map.

Aeolopus dociostauroides I. Bolivar, 1912 : 269; Dirsh, 1963 : 264.
Aeolopus fasciatipes I. Bolivar, 1912 : 270; Dirsh, 1963 : 264.
Aeolopus perpusillus I. Bolivar, 1912 : 270; Dirsh, 1963 : 264.
Aiolopus rodericensis (Butler, 1876) Uvarov, 1928 : 364.

Type locality. Rodriguez Is., lectotype ♂ designated by Dirsh (1963) and deposited in the BM(NH).

Differs from nominate subspecies in the following ways:

♂. Fastigial foveolae trapezoid, narrowing forwards, about one and a half times as long as maximum width, very shallow; frontal ridge finely and sparsely pitted, gradually and continuously narrowing upwards, slightly convex, flat or slightly sulcate at and below median ocellus and with very weak lateral carinulae; mesosternal interspace slightly wider than long; tegmen shorter, E/P ratio averaging 4·60; hind femur wider, ratio of length to maximum width averaging 3·78. Phallic complex (Text-figs. 85–88) with basal valves of penis hardly expanded and not recurved.

♀. E/P ratio averaging 4·58; FL/FW ratio averaging 3·79; spermatheca as in Text-fig. 89.

General colouration ochraceous and brown or greenish with median longitudinal ochraceous stripe which extends forwards weakly onto head; pronotum normally with cross-shaped ochraceous pattern on dorsum or if without then median stripe widens forwards in prozona. Hind femur with three incomplete dark fasciae on outer surface which are often weak and irregular; inner surface with three black fasciae, apical one always complete, median fascia often weak, and basal fascia either occasionally absent or complete and partially fused with median fascia; hind tibia with narrow basal black band follosed by broad ochraceous band, then with narrow incomplete black band, then broad bluish band which continues dorsally to apex of tibia but is interrupted apico-ventrally by blackish area. Tegmen with three incomplete dark bands, the apical one often dispersed, costal area with broken ochraceous or green stripe.

Measurements (mm.). Length of body, ♂ 13·8–21·5, ♀ 19·2–28·7. Length of pronotum, ♂ 2·8–4·2, ♀ 3·8–5·4. Length of tegmen, ♂ 12·4–20·6, ♀ 16·4–24·9. Length of hind femur, ♂ 7·8–12·7, ♀ 11·4–15·6. Maximum width of hind femur, ♂ 2·3–3·4, ♀ 3·0–4·1. Maximum width of head, ♂ 2·5–3·6, ♀ 3·3–4·6.

Ratios (twenty specimens of each sex measured):

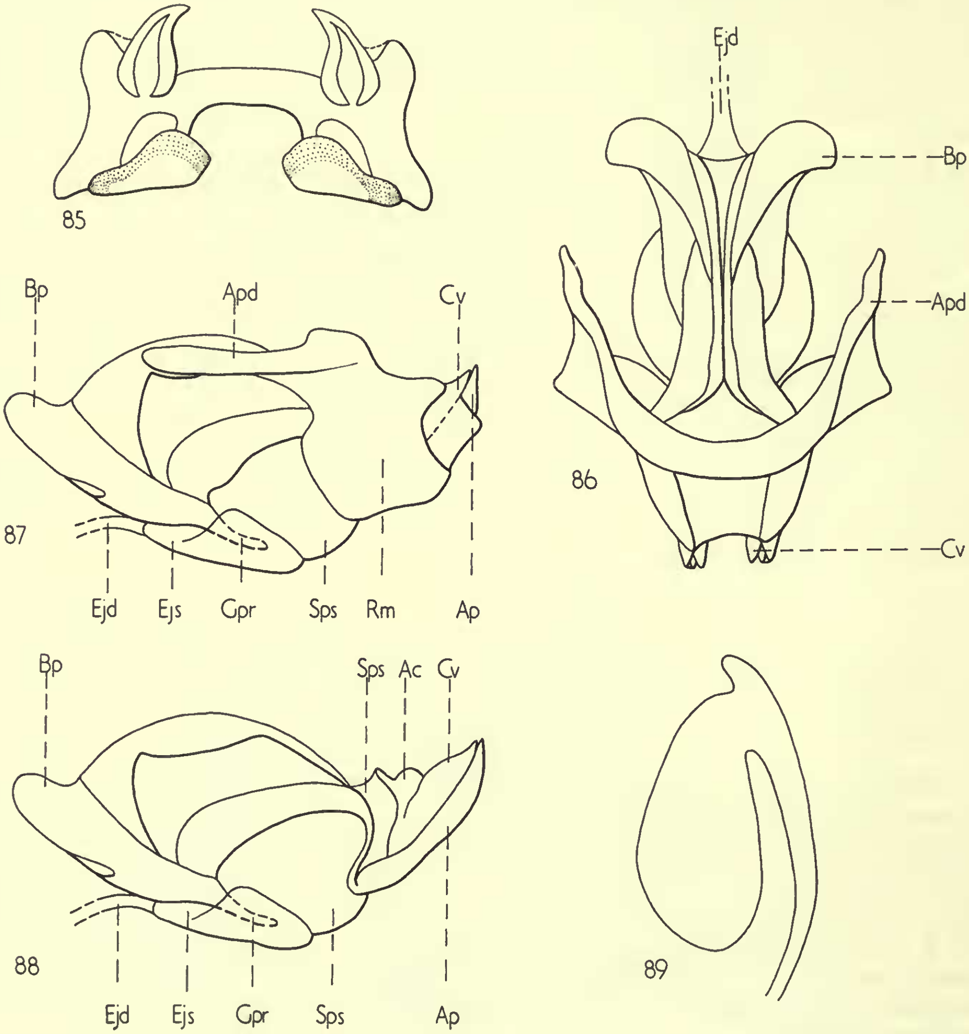
	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max
♂	1·06	1·15	1·23	3·39	3·78	4·12	4·27	4·60	4·90	1·41	1·51	1·67
♀	1·07	1·12	1·21	3·64	3·79	4·00	4·09	4·58	5·08	1·41	1·58	1·79

Discussion. This subspecies is quite variable in size, colouration and degree of flatness of the frontal ridge. Dirsh (1963 : 267), in discussing the species he synonymized with *A. rodericensis*, states " Other characters, such as width of frontal ridge which depends upon the stoutness of head do not exceed the range of variability; *A. laticosta* (I. Bol.) being one of the extreme variants in this respect ". In fact it is the overall shape of the frontal ridge which is different in *laticosta*, and coupled with the short hind tibia and the form of the pronotum the present author disagrees with Dirsh's synonymy and places *laticosta* into synonymy with *A. simulatrix* (Walker).

A. th. rodericensis has been previously regarded as a species and Dirsh (1963) considered it to belong to the " *savignyi* group " by virtue of its broad hind femur.

The present author regards this taxon as a subspecies of *A. thalassinus*; the range of stoutness of the hind femur falls between that of *A. simulatrix* (= *A. savignyi*) and that of *A. thalassinus*, the hind tibia is not as short as in *A. simulatrix*, and the form of the frontal ridge and pronotum are of the same type as *A. thalassinus*.

Morphological differences between *A. th. rodericensis* and the mainland subspecies are not very clearly defined; in *rodericensis* the head tends to be broader and this is demonstrated in the P/C ratio, the tegmen is shorter as is demonstrated in the E/P ratio, the hind femur is broader as is shown in the FL/FW ratio, the fastigial foveolae are slightly more square and there is no red colouration on the hind tibia.



FIGS. 85–89. *A. thalassinus rodericensis* (Butler), genitalia. 85, ♂ epiphallus; 86, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 87, same, lateral view; 88, ♂ endophallus, lateral view; 89, ♀ spermatheca.

A comparison of the E/P and FL/FW ratios for both *thalassinus* and *rodericensis* is given in Text-figures 90 and 91.

Certain very general trends are visible in this subspecies across its range from Madagascar to the Seychelles Islands; as the populations extend eastwards the individuals tend to become smaller, and the tegmen becomes relatively shorter and the frontal ridge flatter; the latter even tends to have very weak lateral carinulae at and below the median ocellus. However, these trends are not always complete, and specimens showing characters against the general trends are often encountered.

Type localities of synonymized species.

Epacromia famulus [*sic*] var. *pusilla* I. Bol. Lectotype ♂, Mahe (Seychelles), designated by Dirsh (1963 : 267) and deposited in Paris.

Aeolopus aldabrensis I. Bol. Lectotype ♀, Aldabra, designated by Dirsh (1963 : 267) and deposited in BM(NH).

Aeolopus dociostauroides I. Bol. Lectotype ♂, Coetivy (Seychelles), designated by Dirsh (1963 : 267) and deposited in BM(NH).

Aeolopus fasciatipes I. Bol. Lectotype ♀, Farquar Atoll, designated by Dirsh (1963 : 267) and deposited in BM(NH).

Distribution (Text-fig. 84). Two hundred and thirty-one specimens of this subspecies were examined and the following conclusions concerning its distribution were made:

MADAGASCAR, April to June, November through to February; REUNION, June; MAURITIUS, January, May; RODRIGUEZ IS., February; ALDABRA GROUP, May to December; SEYCHELLES GROUP, February to December.

Aiolopus thalassinus tamulus (Fabricius, 1798) **stat. n.**

(Text-figs. 22, 23, 84, 92–96)

Gryllus tamulus Fabricius, 1798 : 195.
Gomphocerus tricoloripes Burmeister, 1838 : 649; Kirby, 1910 : 192.
Epacromia rufostriata Kirby, 1888 : 550, **syn. n.**

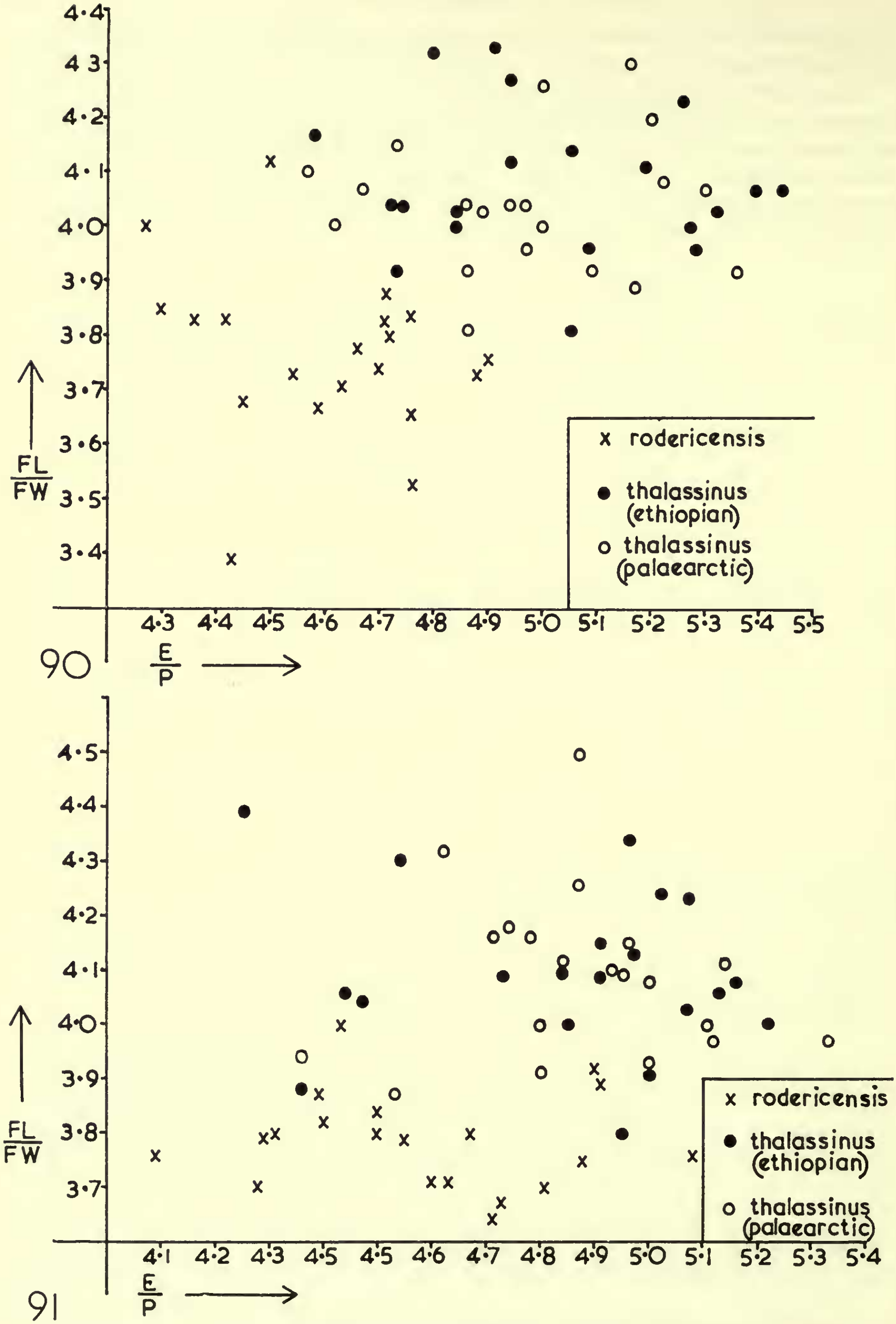
Type locality. " Ind: or. et China ", lectotype ♂ designated by Key (1967) and deposited in the Copenhagen Mus.

Differs from nominate subspecies in the following ways:—

♂. Fastigium with forward angle more acute (Text-figs. 22–23); fastigial foveolae narrowing more strongly anteriorly (Text-figs. 22–23), frontal ridge flat and continually narrowing upwards (Text-figs. 22–23); or weakly sulcate and with weak lateral carinulae, and junction with fastigium more angular; pronotum with " shoulders" of prozona more parallel in prozona and sometimes even with very weak lateral carinae in prozona; posterior margin of pronotum more rounded. Phallic complex (Text-figs. 92–95) with basal valves of penis less expanded laterally and not recurved.

♀. Spermatheca as in Text-fig. 96.

General colouration differs in that ochraceous or green stripe along costal area of tegmen is usually complete; external area of hind femur without oblique fasciae; hind tibia with red



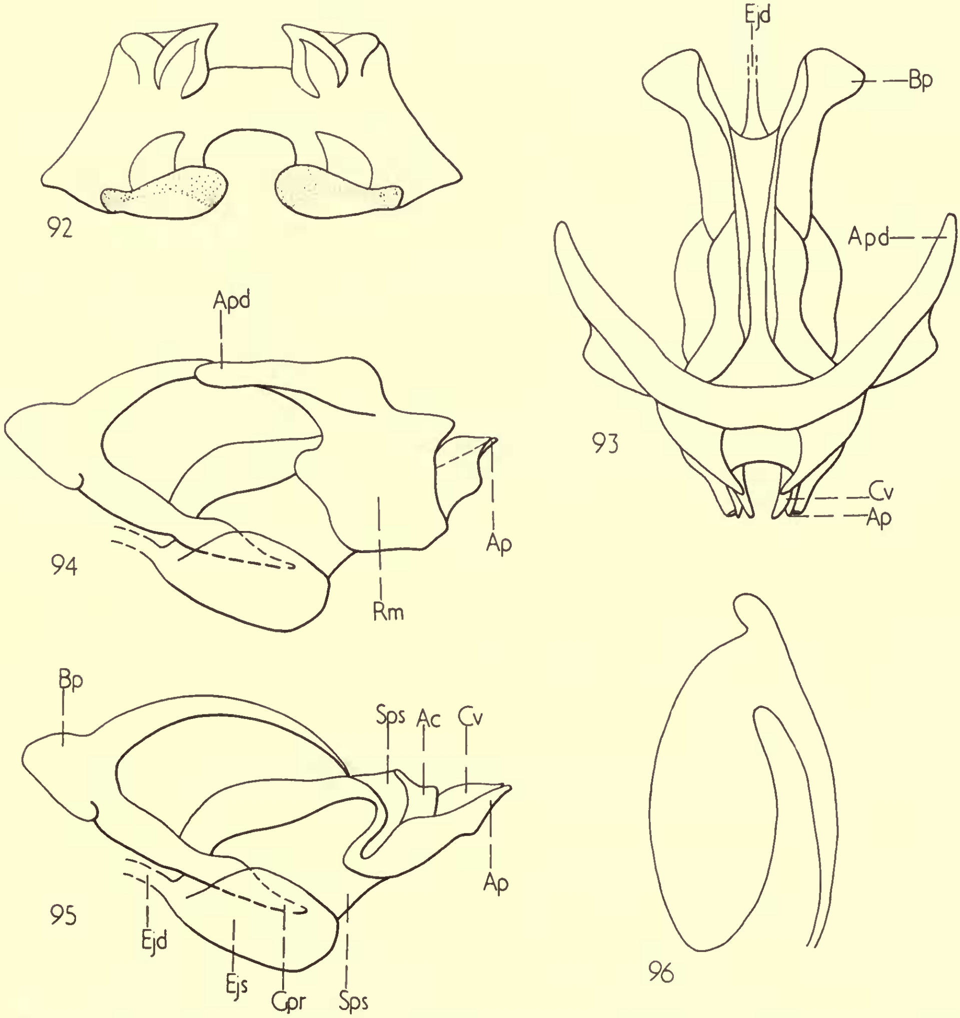
FIGS. 90–91. *A. thalassinus* sspp., scatter diagrams comparing values of FL/FW against E/P. 90, males; 91, females.

colouration in apical third only or not at all, and broadly separated from median black band by broad bluish grey band.

Measurements (mm.). Length of body, ♂ 17·9–22·2, ♀ 21·7–29·5. Length of pronotum, ♂ 3·3–4·3, ♀ 4·0–5·3. Length of tegmen, ♂ 16·8–21·5, ♀ 19·8–27·0. Length of hind femur, ♂ 10·5–13·1, ♀ 11·7–15·9. Maximum width of hind femur, ♂ 2·5–3·2, ♀ 2·9–3·8. Maximum width of head, ♂ 2·7–3·5, ♀ 3·5–4·5.

Ratios (twenty specimens of each sex measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·11	1·21	1·32	4·00	4·15	4·38	4·67	5·07	5·51	1·50	1·62	1·72
♀	1·12	1·19	1·29	4·03	4·21	4·53	4·69	5·03	5·44	1·49	1·66	1·75



FIGS. 92–96. *A. thalassinus tamulus* (Fabr.), genitalia. 92, ♂ epiphallus; 93, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 94, same, lateral view; 95, ♂ endophallus, lateral view; 96, ♀ spermatheca.

Discussion. This subspecies shows considerable variation in size and general colouration to the same extent as in the nominate subspecies. In the Australasian region the fastigium of the vertex tends to become more rounded, the frontal ridge narrows less conspicuously upwards and the hind tibia tends to lose the red colouration. As a whole Australasian populations of *tamulus* show a general transition towards the Polynesian subspecies *dubius* but may be easily separated from the latter by the absence of a complete black-brown colouration on the ventral surface of the hind tibia.

A. thalassinus tamulus was previously regarded as a distinct species and identified by the form of the frontal ridge and fastigium and the colouration of the hind tibia. These characters are fairly distinct in populations in east India and S.E. Asia but gradually become less distinct and merge with *thalassinus* in west India and, as mentioned above, with *dubius* in Polynesia. For this reason *tamulus* is here considered as a subspecies of *thalassinus*.

The type of *Gomphocerus tricoloripes* Burmeister could not be traced in the Halle Institute or the Berlin Museum but from the original description it is clear that Kirby's syononymy is correct. *Gryllus dorsalis* Thunberg was removed from the synonymy of this taxon and transferred to the genus *Anaeolopus* (Hollis, 1967). The type of *Epacromia rufostriata* Kirby, deposited in the BM(NH), differs from the lectotype of *tamulus* mainly in the form of the frontal ridge which in the former is very acute (Text-fig. 23). As this frontal ridge form is also displayed by specimens from Java and to a lesser extent by specimens from the Malayan mainland Kirby's species is here synonymized.

A specimen from Timor, identified by C. Willemse as *A. timorensis* n. sp. (MS), is atypical in that the colouration is generally much darker, the pale stripe along the costal area of the tegmen is reduced to two pale spots and the hind tibia is without the normal bluish band and is orange in the apical half. Morphologically however the specimen agrees in detail with *tamulus* and the present author considers there is insufficient evidence at present upon which to base a separate taxon.

Type localities of synonymized species.

Gomphocerus tricoloripes Burm. Type not located.

Epacromia rufostriata Kirby. Holotype ♂, Christmas Island (Indian Ocean), deposited in BM(NH).

Distribution (Text-fig. 84). From the five hundred and thirty specimens examined of this subspecies the following distributional conclusions were made:

INDIA, March to December; CEYLON, June, September to November, January; EAST PAKISTAN, July to August; NICOBAR Is., March; ANDAMAN Is., February to March, June, September; BURMA, May, August, October; THAILAND, February, May to August, October; CHINA, June, August to November; HAINAN, April to June; HONG KONG, October; TAIWAN, August; MALAYA, June to August, October, December through to January; SINGAPORE, January, May; SUMATRA, March, September, November; JAVA, September; LOMBOK, April; TIMOR, December; CHRISTMAS Is., (Indian Ocean), October, January to April; JAPAN, September, December;

PHILIPPINE IS., February to May, August, December; MARIANA IS., January, May; BORNEO, January; BRUNEI, June; SABAH, February, July, CELEBES, June; NEW GUINEA, March, August; PAPUA, March; AUSTRALIA, January to March; LORD HOWE IS., November.

Aiolopus thalassinus dubius Willemse, 1923 **stat. n.**

(Text-figs. 24, 84, 97–102)

Aeolopus dubius Willemse, 1923 : 100.

Type locality. The species was described from several males and females from New Caledonia, Loyalty Islands and the New Hebrides. Efforts have been made to trace these specimens but only four females in the British Museum and a male and female in Willemse's collection were traced. Of these the following specimen is selected as a LECTOTYPE: ♂, Neukaledonen, Yate (*F. Sarasin* & *J. Roux*); it is deposited in the Maastricht Museum.

Differs from the nominate subspecies in the following ways:

♂. Fastigial foveolae rectangular and, at most, one and a half times longer than wide; frontal ridge very weakly sulcate (Text-fig. 24); prozona of pronotum often with weak lateral carinae between second and third transverse sulci. Phallic complex (Text-figs. 99–102) with basal valves of penis having rounded lateral expansions which are not recurved.

♀. Spermatheca as in Text-figs. 97–98.

General colouration dark brown with ochraceous and black markings; hind femur normally with inner area black with two incomplete pale bands; hind tibia black or dark brown on ventral and interno-ventral surfaces in apical two thirds; ochraceous costal stripe of tegmen complete.

Measurements (mm.). Length of body, ♂ 16·4–20·4, ♀ 22·2–28·8. Length of pronotum, ♂ 3·2–3·9, ♀ 3·8–5·0. Length of tegmen, ♂ 14·6–19·1, ♀ 18·7–23·3. Length of hind femur, ♂ 9·7–11·8, ♀ 12·2–15·3. Maximum width of hind femur, ♂ 2·4–2·9, ♀ 3·0–3·6. Maximum width of head, ♂ 2·7–3·2, ♀ 3·4–4·3.

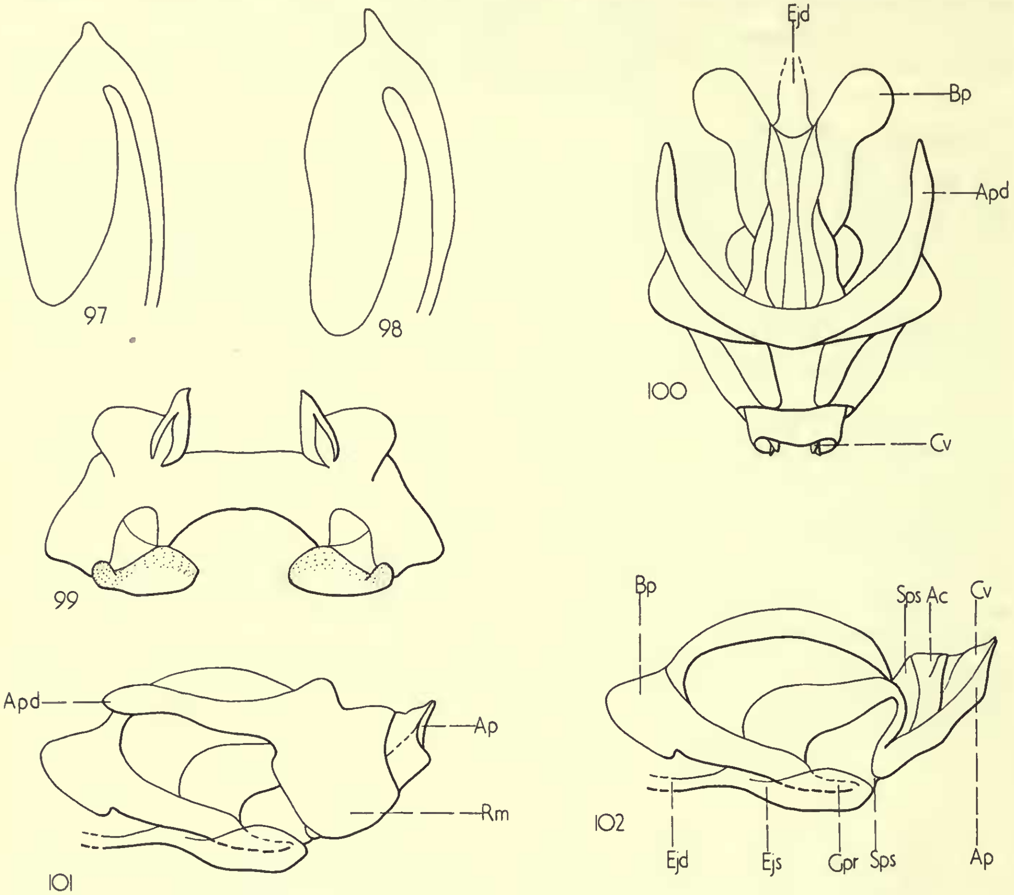
Ratios (twenty specimens of each sex measured):

	P/C			FL/FW			E/P			E/F		
	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.
♂	1·10	1·19	1·32	3·96	4·10	4·21	4·42	4·78	5·17	1·43	1·54	1·62
♀	1·08	1·15	1·22	4·03	4·26	4·48	4·60	4·80	5·10	1·41	1·51	1·59

Discussion. This subspecies appears to be a culmination of a trend in the austro-oriental subspecies *tamulus* as displayed by Australian populations of the latter. The structure of the fastigial foveolae and frontal ridge in *dubius* is similar to that of Australian *tamulus* but the black colouration on the hind tibia in *dubius* serves for separation. To separate a subspecies on the basis of merely a colour difference may be regarded with suspicion, but as the separation is backed by the geographical distribution of the two forms in that *tamulus* is not found east of the Australasian region and *dubius* is restricted to the Polynesian region (Text-fig. 84) it seems reasonable to regard the two forms as separate taxa of subspecific status.

Distribution (Text-fig. 84). Two hundred and fifty-six specimens of this subspecies were examined and from these the following distributional notes were made:

NORFOLK Is., January to February; NEW CALEDONIA, May, July to September, November through to January; LOYALTY Is., no dates; NEW HEBRIDES, throughout the year; FIJI, April to May, October; FRIENDLY Is., February to March; SAVAGE Is., June; SAMOA, February to March, May, August to September.



FIGS. 97–102. *A. thalassinus dubius* (Willemse), genitalia. 97, ♀ spermatheca of specimen from Samoa; 98, same, of specimen from New Hebrides; 99, ♂ epiphallus; 100, ♂ phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 101, same, lateral view; 102, ♂ endophallus, lateral view.

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